NASA

Earth Resources
A Continuing
Bibliography
with Indexes

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October 1985

National Aeronautics and
Space Administration

Earth Resources

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N85-22342 – N85-29909
IAA (A-10000 Series)	A85-30223 – A85-39960

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NASA SP-7041(47)

EARTH RESOURCES

A CONTINUING BIBLIOGRAPHY WITH INDEXES

Issue 47

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced between July 1 and September 30, 1985 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*

NASA Scientific and Technical Information Branch 1985
National Aeronautics and Space Administration
Washington, DC

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INTRODUCTION

The technical literature described in this continuing bibliography may be helpful to researchers in numerous disciplines such as agriculture and forestry, geography and cartography, geology and mining, oceanography and fishing, environmental control, and many others Until recently it was impossible for anyone to examine more than a minute fraction of the Earth's surface continuously Now vast areas can be observed synoptically, and changes noted in both the Earth's lands and waters, by sensing instrumention on orbiting spacecraft or on aircraft.

This literature survey lists 524 reports, articles, and other documents announced between July 1 and September 30, 1985 in *Scientific and Technical Aerospace Reports (STAR)*, and *International Aerospace Abstracts (IAA).*

The coverage includes documents related to the identification and evaluation by means of sensors in spacecraft and aircraft of vegetation, minerals, and other natural resources, and the techniques and potentialities of surveying and keeping up-to-date inventories of such riches It encompasses studies of such natural phenomena as earthquakes, volcanoes, ocean currents, and magnetic fields; and such cultural phenomena as cities, transportation networks, and irrigation systems. Descriptions of the components and use of remote sensing and geophysical instrumentation, their subsystems, observational procedures, signature and analyses and interpretive techniques for gathering data are also included All reports generated under NASA's Earth Resources Survey Program for the time period covered in this bibliography will also be included. The bibliography does not contain citations to documents dealing mainly with satellites or satellite equipment used in navigation or communication systems, nor with instrumentation not used aboard aerospace vehicles.

The selected items are grouped in nine categories These are listed in the Table of Contents with notes regarding the scope of each category These categories were especially chosen for this publication, and differ from those found in *STAR* and *IAA*.

Each entry consists of a standard bibliographic citation accompanied by an abstract The citations include the original accession numbers from the respective announcement journals

Under each of the nine categories, the entries are presented in one of two groups that appear in the following order

IAA entries identified by accession number series A85-10,000 in ascending accession number order,

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After the abstract section, there are seven indexes:

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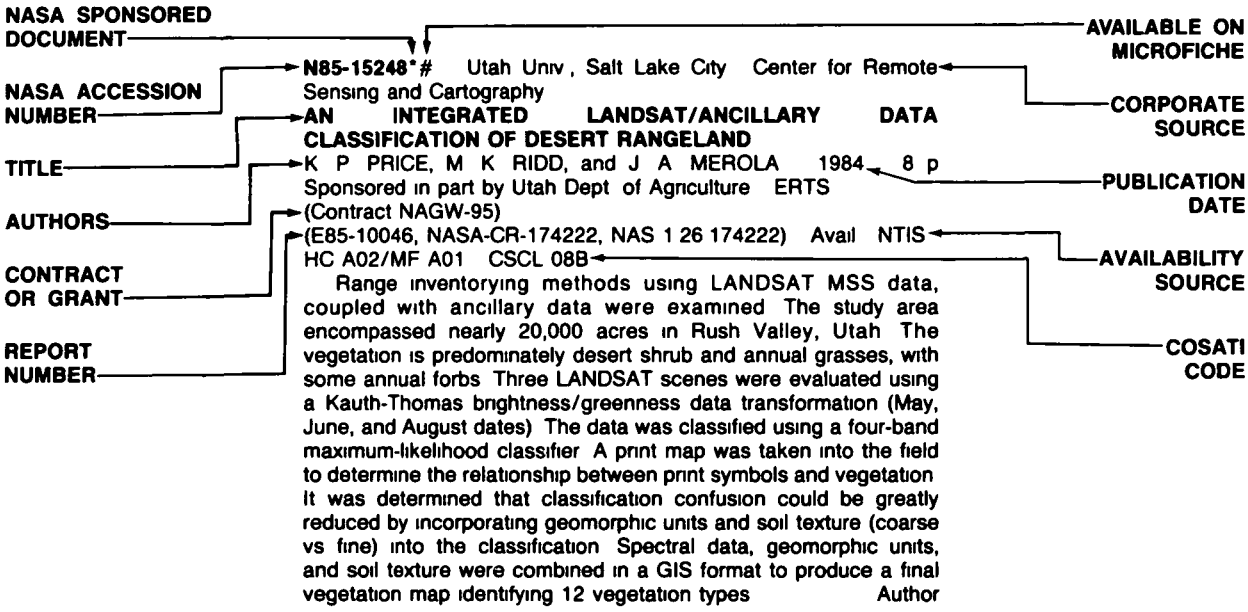

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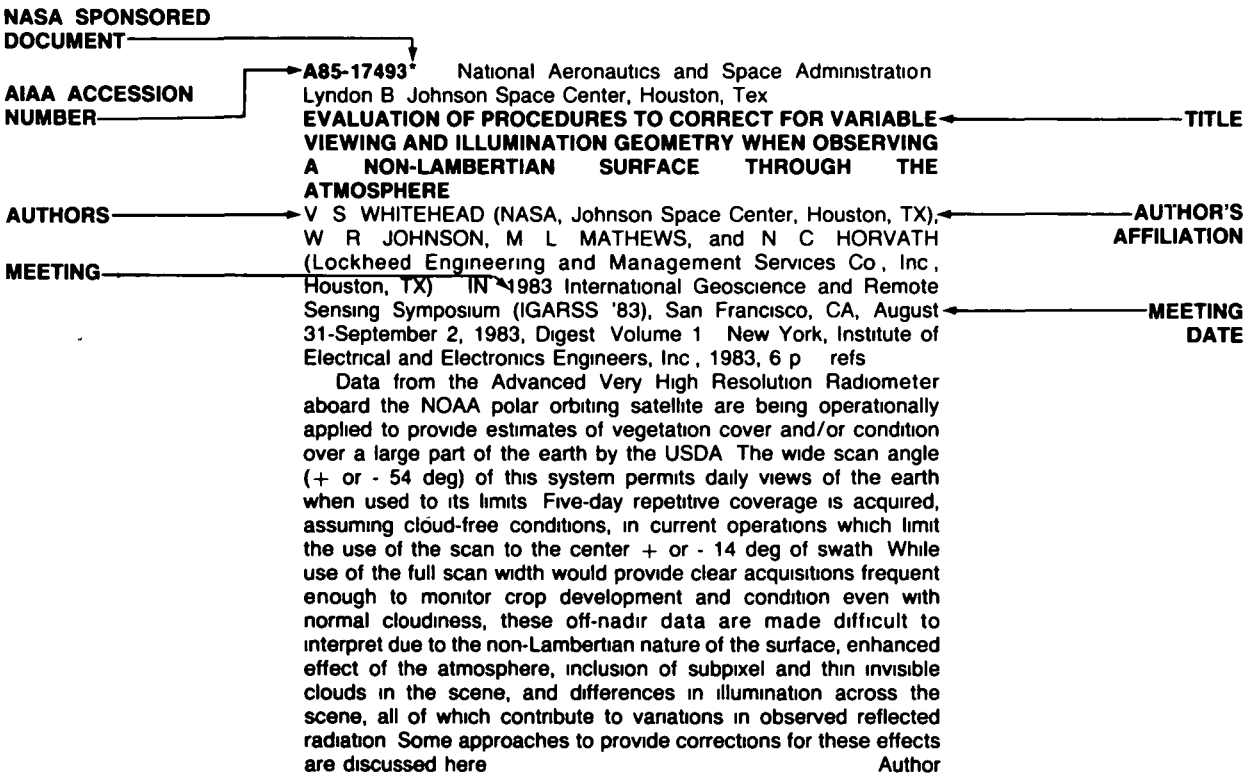


EARTH RESOURCES

A Continuing Bibliography (Issue 47)

OCTOBER 1985

01

AGRICULTURE AND FORESTRY

Includes crop forecasts, crop signature analysis, soil identification, disease detection, harvest estimates, range resources, timber inventry, forest fire detection, and wildlife migration patterns

A85-30727
ECOLOGICAL STUDIES IN THE UKAI COMMAND AREA
B SAHAI, M H KALUBARME (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), and K L JADAV (Directorate of Agriculture, Ahmedabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 401-409 refs

The present study was directed towards studying the impact of the Ukai-Kakrapar irrigation project on the ecology of the command area with particular reference to changes in cropping pattern and land degradation due to waterlogging/salinity The data used were multitemporal (1972-1981) Landsat imagery of the entire command area, multitemporal color infrared plus black-and-white aerial photography, and multispectral scanner data over a test area of about 1200 sq km collected from November 1980 to February 1982 Land-use maps for the entire command area at 1 250,000 scale (Landsat) and land-use/cropping-pattern maps for the test area at 1 12,500 scale (aerial photography) have been prepared The results indicate that due to the introduction of large-scale irrigation, the cropping pattern has changed and the acreage under heavy perennial crops such as sugar-cane and banana has increased beyond permissible limits resulting in a rapid rise in the water-table in the area The areas delineated as waterlogged and salt-affected from the aerial and Landsat imagery, when correlated with the subsoil water-table data, were found to have the water-table within 0-1 5 to 1 5-3 0 m Author

A85-30728
FOREST-TYPE STRATIFICATION AND DELINEATION OF SHIFTING CULTIVATION AREAS IN THE EASTERN PART OF ARUNACHAL PRADESH USING LANDSAT MSS DATA
P S ROY (National Remote Sensing Agency, Hyderabad, India), R N KAUL, M R SHARMA ROY, and S S GARBYAL (Arunachal Pradesh Forest Department, Itanagar, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 411-418 refs

A85-30729
EVALUATION OF LANDSAT AND AIRBORNE MULTISPECTRAL DATA AND AERIAL PHOTOGRAPHS FOR MAPPING FOREST FEATURES AND PHENOMENA IN A PART OF THE GODAVARI BASIN
N V MADHAVAN UNNI, P S ROY (National Remote Sensing Agency, Hyderabad, India), and V PARTHASARATHY (Forest Department, Hyderabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 419-431 refs

A85-30740
LAND USE AND FORESTRY STUDIES OF HIMACHAL PRADESH
D M GUPTA and M K MUNSHI (Survey of India, New Delhi, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 535-539 refs

Of late, deforestation and the resulting soil erosion, especially in the hilly regions of India, has become a matter of concern and is receiving attention at the highest official level in the country In this context the study in the changes in forestry and land use of the Himachal Pradesh, known for its scenic beauty and forests, assumes special significance In this study, which was undertaken as an end-to-end experiment under the national natural resources management system program in India, the land-use changes in the state were initially analyzed on the basis of available topographical maps Subsequently, the changes in the forest cover was evaluated with the help of Landsat data of 1973, 1977 and 1980 Author

A85-30745
ASSESSMENT OF WATER-STRESS EFFECTS ON CROPS
D S KAMAT, A K S GOPALAN, AJAI, M N SHASHIKUMAR (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), S K SINHA, G S CHATURVEDI, and A K SINGH (Indian Agricultural Research Institute, New Delhi, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 577-589 refs

Wheat, chickpea, and mustard crops in an agricultural area of India were studied from October-April 1980-1981 to provide a ground truth data base for satellite-based crop monitoring Attention was focused on the spectral signatures of crop growth stages and vigor, water stress, and canopy temperature variations over the crop cycle Efforts were also expended to develop a yield model Radiometer data from 400-1100 nm were gathered, along with soil nutrient content, leaf area measurements, dry biomass, chlorophyll content, and water potential readings Comparisons were made between the vigor of irrigated and nonirrigated crops High correlations were established between spectral indices and the measured crop vigor variables, with the leaf area index being used as input to a model for calculating daily photosynthesis and respiration rates, the latter being a measure of the dry matter accumulation M S K

A85-30826
COLOR AERIAL PHOTOGRAPHY IN THE PLANT SCIENCES AND RELATED FIELDS; PROCEEDINGS OF THE NINTH BIENNIAL WORKSHOP, ORLANDO AND UNIVERSITY OF FLORIDA, LAKE ALFRED, FL, NOVEMBER 15-17, 1983
G J EDWARDS, ED (Florida, University, Lake Alfred, FL) Workshop sponsored by the American Society of Photogrammetry Falls Church, VA, American Society of Photogrammetry, 1984, 210 p For individual items see A85-30827 to A85-30845

The history of the air color photography workshops is considered along with a history of the Everglades and future applications of aerial imagery, aerial photo coverage planning, training and testing interpreters of small scale CIR photography, the detection of forest stress with 35 mm color photographs, and the analysis of photo interpretation test results for seven aerospace image types on the Mendocino National Forest Attention is also given to the interpretability of small and medium scale aerospace imagery for

wildland environments of California and Colorado, Alaska meander lines determined by vegetation appearance on color infrared photographs, the use of aerial photography to detect vegetation damage in large-scale air quality monitoring program, and the effects of the pubescence of Texas lantana on leaf spectra and image Other topics explored are related to the use of color and color infrared in control resources, spectral densitometer applications to stress detection in citrus, the devastation of a vineyard by phylloxera, and the estimation of woody biomass in slash pine plantations using color aerial photography G R

A85-30827
A HISTORY OF THE EVERGLADES AND FUTURE IMPLICATIONS OF AERIAL PHOTOGRAPHY
J R ORSENIGO (Florida Sugar Cane League, Inc , Clewiston, FL) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 7-14

The formation of the Florida peninsula is discussed, taking into account the development of the organic soils of the Everglades The Everglades National Park shows now the plant and animal life which was typical for a time perhaps two to four thousand years ago Attention is given to various species of flora and fauna, the flatwoods of Florida, the undeveloped area of south Florida, the Indian tribes formerly inhabiting Florida, and modern-day Florida It is pointed out that one of the problems of south Florida today is ever-increasing urbanization The use of aerial photography in Florida is considered, taking into account the detection and identification of plant species, the detection of plant injury, and delineation problems G R

A85-30829
ACQUISITION, PROCESSING AND PHOTO INTERPRETATION OF AN AERIAL COLOR INFRARED PHOTOGRAPH
W S RULE (Crowley Ridge Aero Service, Baton Rouge, LA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 31-34

Indirect evidence is obtained from large scale, low altitude aerial color infrared (ACIR) photography at a given point in time While some direct evidence is also obtained by this method, much direct evidence is obtained from good ground truth work utilizing indirect evidence as a guide The planning, acquisition, film processing, process control, and interpretation of an agricultural photograph are presented in this paper Research is needed to verify techniques, improve on existing techniques, interface computers for better data handling and to interface computer management programs presently used on some major crops Author

A85-30830
TRAINING AND TESTING INTERPRETERS OF SMALL-SCALE CIR PHOTOGRAPHY - A DIGITIZER-AIDED APPROACH
C J DEMARS, JR (U S Forest Service, Berkeley, CA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 35-43 refs

A digitizer-aided system to record and compare the locations of individual dead and dying pine trees detected on panoramic optical bar camera photography using either monoscopic or stereoscopic viewing was recently developed In a test, the interpretations of expert observers were compared with those of novice observers Experts performed as well with 15-20 x monoscopic viewing as with a 4 5 x stereoscopic viewing in interpreting central segments of the panoramic photograph, within 12 deg of nadir In these segments, trainees using 4 5 x stereoscopic viewing performed as well as experts, but performed more poorly than experts when using 15-20 x monoscopic viewing All interpreters benefitted from stereoviewing at angles greater than 12 deg from nadir, with experts performing better than trainees Extensive feedback between expert and trainee to reach a consensus on correct interpretations and reduce errors is needed Author

A85-30831
DETECTION OF FOREST STRESS WITH 35MM COLOR PHOTOGRAPHS
C E OLSON, JR (Michigan, University, Ann Arbor, MI) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 45-50 refs

It is pointed out that color aerial photography does not have to be expensive Thus, many of the reconnaissance and monitoring needs in the plant sciences can be met with 35 mm or 70 mm photographs taken from light aircraft However, any technique must meet certain conditions to be truly cost-effective Some of these conditions have now been identified with the aid of recent experience in detecting and evaluating insect and disease attacks in forest stands The present investigation is concerned with two examples regarding the considered developments, taking into account work with an OM-1 camera and a camera mount described by Meyer (1973) One example involves the assessment of spruce budworm damage, while the second entails an evaluation of Diplodia twig blight The described studies illustrate the cost-effectiveness of color aerial photographs taken with 35 mm cameras from light aircraft G R

A85-30832
ANALYSIS OF PHOTO INTERPRETATION TEST RESULTS FOR SEVEN AEROSPACE IMAGE TYPES ON THE MENDOCINO NATIONAL FOREST, CALIFORNIA
A S BENSON and K J DUMMER (California, University, Berkeley, CA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 51-60

A85-30833
THE INTERPRETABILITY OF SMALL AND MEDIUM SCALE AEROSPACE IMAGERY FOR WILDLAND ENVIRONMENTS OF CALIFORNIA AND COLORADO
A S BENSON and K J DUMMER (California, University, Berkeley, CA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 61-69

Three series of photo interpretation tests were given to measure the relative interpretability of different types of aerospace imagery with respect to wildland environments in California and Colorado The images included conventional scale U S Forest Service photography, U-2 photography, and Landsat enhancements The results of these three years of study indicate that small scale color infrared photography (scales ranging from 1 30,000 to 1 60,000) would be the optimum image type for meeting all resource information requirements, but that careful consideration must still be given for selecting an image type to meet a specific resource information requirement Author

A85-30834
ALASKA MEANDER LINES DETERMINED BY VEGETATION APPEARANCE ON COLOR INFRARED PHOTOGRAPHS
C A MCCAFFREY (U S Bureau of Land Management, Branch of Photogrammetry, Anchorage, AK) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 71-75 Research supported by the U S Bureau of Land Management

A85-30835
USING AERIAL PHOTOGRAPHY TO DETECT VEGETATION DAMAGE IN A LARGE-SCALE AIR QUALITY MONITORING PROGRAM
B M EVANS (Resource Technologies Corp , State College, PA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 77-88 refs

A85-30836
PUBESCENCE OF TEXAS LANTANA AFFECTS LEAF SPECTRA AND IMAGERY
J H EVERITT, H W GAUSMAN, and S J. INGLE (U S. Department of Agriculture, Agricultural Research Service, Weslaco, TX) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 . Falls Church, VA, American Society of Photogrammetry, 1984, p 89-97. refs

Texas lantana (Lantana horrida), also called calico bush, is a shrub found on sandy and sandy loam soils throughout the eastern two-thirds of Texas and Mexico Texas lantana has an unpleasant pungent odor and is unpalatable to either livestock or wildlife The identification of this undesirable shrub with the aid of aerial photography could provide a basis for the control or the reduction of the population of Texas lantana The present investigation is, therefore, concerned with the feasibility of using color-infrared (CIR) aerial photography as a management tool to distinguish Texas lantana from other plant species on south Texas rangelands The possibility to base such a distinction on differences regarding the reflectance in the case of the plant leaves was considered, taking into account the leaf pubescence (hairiness) of the Texas lantana It is found that large scale CIR aerial photography should be a useful tool for the identification of Texas lantana G R

A85-30837
SPECTRAL DENSITOMETER APPLICATION TO STRESS DETECTION IN CITRUS
G J EDWARDS and C H BLAZQUEZ (Florida, University, Lake Alfred, FL) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 105-110 refs

Spectral densitometer analysis of Aerial Color Infrared film (ACIR) of the same 64 citrus tree images was studied over a 6-year-period The spectral reflectance curves of each tree had two maximum intensities, one near 0 480 micrometers and one near 0 600 micrometers The ratio formed with the two intensities is smaller for healthy trees than for trees under stress Due to the variability in color among rools of film, the ratio values are not the same, however, increased ratio value always increases with increased stress Author

A85-30838
THE DEVASTATION OF A VINEYARD BY PHYLLOXERA
W E WILDMAN (California, University, Davis, CA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, Fl, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 111-119

The aphid-like insect, Phylloxera vitafolia (Fitch) is a native feeder on certain wild species of grapevines in North America These species can tolerate the insect without suffering permanent damage However, the European grapevines, Vitis vinifera, are highly susceptible to the root feeding form of the insect and are usually stunted and eventually killed Vinifera grapevines with phylloxera-resistant rootstocks have now been developed, but, for economic reasons, vinifera grapevines with nonresistant rootstocks are still being used. It is, therefore, important to trace the increase of grapevines stunted or killed by phylloxera on the basis of annually taken aerial photographs Phylloxera outbreaks in two separate Napa Valley vineyard blocks were selected for study In connection with the present investigation, a report is provided of the study of one of these blocks G R

A85-30839
ESTIMATION OF WOODY BIOMASS IN SLASH PINE PLANTATIONS USING COLOR AERIAL PHOTOGRAPHY - A FEASIBILITY STUDY
A A ROST and L G ARVANITIS (Florida, University, Gainesville, FL) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 121-128 Research supported by the U S Forest Service refs

A85-30840
COLOR AND COLOR-IR PHOTOGRAPHY FOR ASSESSING FOREST PEST MANAGEMENT TACTICS
W M CIESLA (U S Forest Service, Forest Pest Management/Methods Application Group, Fort Collins, CO) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 129-141 refs

Color and color-IR photos, at a variety of photo scales and film formats, have been used, either alone or in combination with ground data, to evaluate effectiveness of a number of forest pest management tactics Several case histories are presented where this approach was used with varying degrees of success These include evaluation of aerial applications of chemical and microbial insecticides against forest tent caterpillar, pandora moth, and gypsy moth, and demonstration of silvicultural treatments to prevent mountain pine beetle infestations Optimum photo scales, film types and formats, and some analytical approaches to evaluating treatment effects from aerial photos are described Author

A85-30841
INVENTORYING FLORIDA'S CITRUS GROVES
J W TODD (Florida Crop and Livestock Reporting Service, Orlando, FL) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 143-145

Each second winter since 1965-66 the Florida Crop and Livestock Reporting Service has photographed the State's citrus production belt to maintain an inventory of commercial citrus groves Approximately 150,000 homogeneous variety blocks are delineated and indexed on master photographic enlargements, with the accompanying vital statistics documented in a data base file To accomoplish this task approximately 14,000 square miles are photographed by an aerial contractor using black and white panchromatic film Author

A85-30845#
UTILITY GUIDE FOR AERIAL PHOTOGRAPHY
H M LACHOWSKI (U S Forest Service, Washington, DC) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 167-171

A utility guide for aerial photography is a tool that allows resource managers to determine photography's ability to satisfy certain information requirements It consists of hierarchically scaled user requirements and an empirically derived relationship between the scaled requirements and photo acquisition specifications The Forest Service is currently developing a utility guide for resource photography used by the National Forests The new techniques will be tested during the resource photography selection process on several National Forests Author

A85-30965
DIGITAL PROCESSING TO IMPROVE FOREST CLASSIFICATION RESULTS AT RESOLUTIONS OF 5 TO 50 METRES
F J AHERN, D N H HORLER, J CIHLAR (Canada Centre for Remote Sensing, Ottawa, Canada), W J BENETT (Intera Environmental Consultants, Ltd , Calgary, Alberta, Canada), and E MACAULAY (Nova Scotia Department of Lands and Forests, Canada) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 153-170 refs

New developments regarding remote sensing technology and its utilization are related to significant improvements in sensor resolution and increasing prices for Landsat data The question of the possible usefulness of Landsat data arises in connection with the work of the Nova Scotia Department of Lands and Forests (NSDLF) The NSDLF is annually required to identify, map, and report all logging on Crown land, which comprises 1 6 million ha A study was, therefore, conducted to determine the quality of forest information which can be obtained using various spatial resolution data and digital spatial processing techniques Attention is given to visual assessment, aggregated area estimates, mapping accuracy, areas of small clearcuts, and the improvement of classification results by various means G R

A85-32102
INFLUENCE OF THE VIEWING GEOMETRY ON VEGETATION MEASURES
K STAENZ (Intera Environmental Consultants, Ltd , Ottawa, Canada), R J BROWN, and P M TEILLET (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 5-12 refs

The influence of viewing geometry on vegetation measurements (indices) which are used for monitoring vegetation biomass and physiological conditions is discussed To investigate the dependence of vegetation indices on the viewing angle, a ground-based reflectance data set acquired with a SPECTRASPAN SP-2000 radiometer from agricultural targets such as soil, rapeseed, and wheat, near Melfort, Saskatchewan is used The data are analyzed using software on a PDP11/10 and the Landsat-4 digital-image analysis system The following vegetation indices are calclated using the TM band 3 and band 4 reflectance factors NIR/red ratio, NIR-red difference, and normalized NIR-red difference It is shown that for the NIR/red ratio for black soil, the viewing angle effect is reduced by an average of 90 percent, whereas for the normalized NIR-red difference for rapeseed and wheat, the reduction is about 60 percent for viewing angle ranges of 0 to 32 deg Nevertheless, the indices still show a significant variation with the viewing angle M D

A85-32113
PRELIMINARY RESULTS OF AN EXAMINATION OF C-BAND SYNTHETIC APERTURE RADAR FOR FORESTRY APPLICATIONS
D G LECKIE (Petawawa National Forestry Institute, Chalk River, Ontario, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 151-164 Research supported by the Canada Centre for Remote Sensing refs

A85-32114
GLOBAL CROP CONDITION ASSESSMENT USING REMOTELY SENSED SATELLITE DATA
J R HICKMAN (U S Department of Agriculture, Foreign Crop Condition Assessment Div , Houston, TX) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 165-173 refs

An analysis of remotely-sensed satellite data for crop-condition assessment on a large scale, domestic or foreign, is discussed To support a quantifiable estimate of crop condition and production, the Foreign Crop-Condition Assessment Division in Houston, Texas relies on the convergence of evidence from multiple alternate-data sources such as satellite data (both Landsat and NOAA satellite series), model results, and ancillary meteorological and agronomic data The input of the alternate-data sources into Division analyses, the storage and retrieval of ancillary data, and the FCCAD analyst selection and training criteria are considered Wheat is selected as the crop to be used as an example in the analysis The models and parameters that are directly applicable to this crop are examined M D

A85-32125
OPERATIONAL CROP FORECASTING USING REMOTELY SENSED IMAGERY
H L GLICK, J F BENCI (Canadian Wheat Board, Winnipeg, Canada), and R J BROWN (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 331-337, 339-341 refs

An assessment is made of the effectiveness of incorporating satellite remotely sensed data into ground-based synoptic-scale meteorological data as an aid in forecasting worldwide crop conditions The economics of national grain production in Canada for export are influenced by the empirical firmness of perceptions of worldwide grain production, i e , growing conditions in other regions The WMO surface grid of 2000 meteorological stations is not dense enough for good climatic evaluation in some grain-producing parts of the globe Examinations of the use of Landsat MSS and NOAA AVHRR and VISSR sensor data to detect, e g , frost and precipitation, revealed that the higher resolution MSS data were not gathered frequently enough The AVHRR data are useful for crop phrenology and vigor input to crop yield models and for estimating frost and snow damage The GOES satellite VISSR data can serve in quick looks to evaluate the extent of a frost outbreak M S K

A85-32126
EVALUATION OF THE TM, MSS, AND HRV SENSORS IN ESTIMATING THE SURFACE AREA OF CORN WITHIN CANADA [EVALUATION DES CAPTEURS TM, MSS ET HRV POUR ESTIMER LA SUPERFICIE DU MAIS DANS LE CONTEXTE CANADIEN]
K P B THOMSON, M BERNIER, P TEILLET, D HORLER (Canada Centre for Remote Sensing, Ottawa, Canada), and C GOSSELIN (Intera Environmental Consultants, Ltd , Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 343-353 In French refs

A85-32128
LANDSAT INFORMATION AS BASIS FOR A PERMANENT MONITORING OF ECOLOGY AND AGRICULTURAL SITUATIONS IN TROPICAL ZONES
I KIKULA (Dar es Salaam, University, Dar es Salaam, Tanzania), W KIRCHOF (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Forschungszentrum, Wessling, West Germany), and W MUEKSCH (Bonn, Universitaet, Mayen auf dem Werth, West Germany) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 439-448 refs

The Landsat MSS sensors were used to scan drainage patterns, vegetal growth conditions and land use patterns of southern Tanzania in November 1972 The data were employed to generate maps at a 1 50,000 scale which were false color coded for interpretive reasons The classifications were compared with aerial surveys to enhance their accuracy and permit the identification of areas subject to severe erosion The areal images were given artificial boundaries with maximum likelihood statistical analyses and photographic prints were then generated of the maps for interpretive studies Ground truth data were found to be essential for accurate characterizations, particularly for shambas (subsistence farming) regions Overall costs were concluded to be 10 percent the costs associated with aerial surveys M S K

A85-32129
OVERCOMING PROJECT PLANNING AND TIMELINESS PROBLEMS TO MAKE LANDSAT USEFUL FOR TIMELY CROP AREA ESTIMATES
R DOBBINS, R RYERSON, and J LEBLANC-COOKE (Statistics Canada, Agriculture Statistics Div , Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 485-494 refs

A85-32130
OVERCOMING TECHNICAL PROBLEMS TO MAKE LANDSAT USEFUL FOR TIMELY CROP AREA ESTIMATES
R A RYERSON, R DOBBINS, and C THIBAULT (Statistics Canada, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 495-505 Research supported by Statistics Canada, Canada Centre for Remote Sensing, Alberta Remote Sensing Centre, and Canola Council of Canada refs

A85-32132
DRYLAND SALINITY MAPPING IN SOUTHERN ALBERTA FROM LANDSAT DATA - A SEMIOPERATIONAL PROGRAM
M D THOMPSON (Intera Environmental Consultants, Ltd , Calgary, Alberta, Canada), N A PROUT (Intera Environmental Consultants, Ltd , Ottawa, Canada), and T G SOMMERFELDT (Agriculture Canada, Lethbridge, Alberta, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 519-527. Sponsorship. Department of Supply and Services. refs
(Contract DSS-OSZ-81-00110)

A85-32133
NEW REMOTE SENSING TECHNIQUES FOR MONITORING THE FESCUE GRASSLANDS OF ALBERTA
K P B THOMSON, F J AHERN, R J BROWN (Canada Centre for Remote Sensing, Ottawa, Canada), C PEARCE (Calgary, University, Calgary, Alberta, Canada), S HOYLES (Department of Energy, Mines and Resources, Lands Div , Lethbridge, Alberta, Canada), and G FEDOSEJEVS (Intera Environmental Consultants, Ltd , Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings . Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 543-558 refs

A85-32134
A METHOD FOR ENHANCING LANDSAT IMAGES FOR CLASSIFYING PLANT COVER [UNE METHODE DE REHAUSSEMENT D'IMAGES LANDSAT POUR LA CLASSIFICATION DU COUVERT VEGETAL]
J BEAUBIEN (Canadian Forestry Service, Laurentian Forest Research Centre, Sainte-Foy, Quebec, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 559-566 In French refs

Features of a menu-driven algorithm for implementation on the ARIES (Applied Resource Image Exploitation System) for enhancing forest canopy images through selective sampling of Landsat MSS images are described The program divides each spectral band into 0-255 radiance levels Up to three images from different spectral bands can then be overlaid on a CRT with automated scaling of each image to achieve a match Since each color band provides high resolution for a limited number of species, the enhanced images furnish more species identification and vegetal vigor data than single band data Judicious scanning of regions according to statistical criteria lessens the total number of images required for forest health surveillance Statistical sampling of the brightness histograms allows classification of the dominant types of vegetation in a sample zone in terms of the most frequent bands sensed in a 30,000 pixel scene The technique has been applied to mapping 280,000 sq km of northern Canada M S K

A85-32135
A PRACTICAL METHOD FOR MONITORING AND MAPPING CUTOVERS BASED ON THE DIGITAL ANALYSIS OF LANDSAT DATA AND AUTOMATED MAP PRODUCTION
A JANO and S PALA (Ontario Centre for Remote Sensing, Toronto, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 567-573

A85-32136
CLASSIFICATION OF MIRES USING MULTITEMPORAL LANDSAT MSS AND TOPOGRAPHIC MAP DATA
L. BORESJO (Stockholm, Universitet, Stockholm, Sweden) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 581-590 Research sponsored by the Swedish Environmental Protection Board and Naturvetenskapliga Forskningsradet refs

The worth of applying Landsat MSS data in combination with topographic maps to characterize wetlands in Sweden was evaluated A 500 sq km region served as a test area, containing 10 types of wetlands, e g , fens, hummocks, bogs, forests, etc Six Landsat images taken from 1975-79 were treated to furnish uniformly scaled images which could be overlapped The resulting images were compared with color IR images taken in aerial surveys at a 1 60,000 scale Statistical comparisons were also made between the data gathered on different MSS bands A Bayes maximum likelihood classifier was employed for the classifications

A reduction in the fineness of classifications of mire types from ten to six was found necessary to achieve classification accuracies of 90 percent M S K

A85-32139
SEASONAL AND INTERANNUAL EVOLUTION OF THE SPECTRAL SIGNATURE IN FOREST ENVIRONMENTS USING LANDSAT DATA [EVOLUTION SAISONNIERE ET INTER-ANNUELLE DE LA SIGNATURE SPECTRALE EN MILIEU FORESTIER APARTIR DE DOCUMENTS LANDSAT]
R CHAUME and A COMBEAU (Office de la Recherche Scientifique d'Outre-Mer, Bondy, Seine-Saint-Denis, France) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 631-637 In French

Multitemporal Landsat MSS images of two forested regions near Paris were examined in an attempt to track seasonal variations in the spectral signatures of the forest canopy Oak and beech trees dominated one wood, pines the other The variations in spectral signatures are caused by the solar angle, canopy evolution over the year and the soil type The ground truth parcels monitored were captured in 156 x 156 pixel areas of the images A total of 15 images selected from the 1975-81 period were analyzed according to channel, theme and global characteristics Correlations were also sought between leafy and coniferous trees Luminance variations were most apparent on channel 4, and the overall levels were least in winter Thematic trends, however, displayed diverse directions among the channels M S K

A85-32142* Hunter Coll , New York
TIMBER INVENTORY USING LANDSAT
A H STRAHLER (Hunter College, New York, NY) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 665-673 Sponsorship U S Department of Agriculture refs
(Contract USDA-53-9158-0-6362, USDA-8-484032-25214, USDA-1-6504-484032-25218, NAS9-15509, NAS7-100)

The results of recent efforts to apply Landsat MSS imagery, in concert with topological maps, to forestry timber inventories via the FOCIS program are reported FOCIS (Forests Classification and Inventory System) was defined for inventorying the lumber volume of coniferous tree types in rugged terrain regions Data from four bands serve as input for unsupervised clustering and iterative labeling of the elevation, slope angle, and subregions of interest Simulated photographic maps are generated which serve as overlays for regular maps for assessing timber harvests and sales goals Sample procedures followed in mapping the Eldorado region forests in the Sierra Nevada mountains are discussed M S K

A85-33352
MAPPING NATIVE VEGETATION USING LANDSAT DATA
S M TIMMINS (Department of Lands and Survey, Wellington, Department of Scientific and Industrial Research, Physics and Engineering Laboratory, Lower Hutt, New Zealand), B D CLARKSON (Department of Scientific and Industrial Research, Forest Research Institute, Rotorua, New Zealand), W B SHAW (Department of Lands and Survey, Wellington, New Zealand), and I A E ATKINSON (Department of Scientific and Industrial Research, Soil Bureau, Lower Hutt, New Zealand) New Zealand Journal of Science (ISSN 0028-8365), vol 27, no 4, 1984, p 389-397 refs

Landsat imagery of three New Zealand national parks - Egmont, Urewera, and Tongariro - was analyzed for native vegetation Results show that broad vegetation classes can be rapidly and reliably mapped so that small-scale maps showing major physiognomic classes of vegetation can be produced of large areas in a relatively short time Distinguishing between forest types is often not possible Shadowing in steep dissected country makes Landsat data of less use in this terrain However, where detailed vegetation maps are being prepared, areas requiring further field checking can sometimes be quickly highlighted The potential value of Landsat maps for park interpretation has not been fully realized Author

A85-33450
ESTIMATING PHYTOMASS OF SAGEBRUSH HABITAT TYPES FROM MICRODENSITOMETER DATA
L L STRONG (Technicolor Goverment Services, Inc , Moffett Field, CA, Colorado State University, Fort Collins, CO), R W DANA (U S Forest Service, Fort Collins, CO), and L H CARPENTER (Colorado, Div of Wildlife, Fort Collins, CO) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1122), vol 51, April 1985, p 467-474 refs

A85-33556
SIMULATION OF ERRORS IN A LANDSAT BASED CROP ESTIMATION SYSTEM
D B RAMEY and J H SMITH (Lockheed Engineering and Management Service Co , Inc , Houston, TX) (Environmental Research Institute of Michigan, NOAA, NASA, et al , International Symposium on Remote Sensing of Environment, 17th, University of Michigan, Ann Arbor, MI, May 9-13, 1983) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 50, Dec 1984, p 1707-1712 refs

The design, implementation, and performance of the Agricultural Information System Simulator (Agsim), intended for locating design flaws, aiding in the selection of the competing component technologies, and providing iterative feedback for fine-tuning of an estimation procedure, are presented The simulator is an interactive computer program which models each of the major steps required to estimate a region's crop production The approach is generally similar to that of the Landsat-based crop forecasting technology, the simulator combines the use of empirical observations, theoretical probability distributions, and the reconstruction of archived weather patterns The system was used in a study of the effect of changing the Landsat orbit from an 18-day repeat coverage cycle to a 16-day cycle L T

A85-33558* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
CHANGES IN VEGETATION SPECTRA WITH LEAF DETERIORATION UNDER TWO METHODS OF PRESERVATION
M L LABOVITZ, E J MASUOKA (NASA, Goddard Space Flight Center, Geophysics Branch, Greenbelt, MD), and S G FELDMANN (Maryland, University, College Park, MD) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 50, Dec 1984, p 1737-1745 refs

Changes in leaf spectra caused by mineralization under different conditions of preservation are measured using a three-band portable radiometer which simulates three Thematic Mapper bands 3, 4, and 5 Daily spectral measurements of white oak (Quercus alba) leaves did not distinguish among the fresh, bottled, and bagged vegetation in the spectral bands 3 and 5 for up to four days after collection The reflected energy of the preserved vegetation increased thereafter, reportedly due to the loss of chlorophyll and dehydration It is concluded that the measurement procedure is sufficiently sensitive as to discern documented patterns of variation in reflectance measurements L T

A85-35120*# Jet Propulsion Lab, California Inst of Tech, Pasadena
REMOTE DETECTION OF GEOBOTANICAL ANOMALIES ASSOCIATED WITH HYDROCARBON MICROSEEPAGE USING THEMATIC MAPPER SIMULATOR (TMS) AND AIRBORNE IMAGING SPECTROMETER (AIS) DATA
B N ROCK (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 299-309 NASA-supported research refs

An interpretation of TMS and AIS data sets collected from Lost River, West Virginia, are presented, along with a brief review of the supervised vegetation classification approach to vegetation mapping used at Lost River A preliminary study of AIS data suggests that contiguous high-spectral resolution data from a very limited portion of the spectrum (1 2-1 5 micron) provide a greater discriminatory capability than do broad-band sensors such as the TMS covering of wider spectral range (0 45-2 35 microns) V L

A85-37117
EXPERIMENTAL LAND MAPPING BASED ON PHOTOGRAPHIC DATA FROM SPACE [OPYT KARTOGRAFIROVANIIA ZEMEL' NA OSNOVE KOSMICHESKOI FOTOINFORMATSII]
L N KULESHOV (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Zemel'nykh Resursov, Moscow, USSR) Issledovanie Zemli iz Kosmosa (ISSN 0205-9614), Mar -Apr 1985, p 41-44 In Russian refs

The use of photographic images obtained in space to compile large scale (1 500,000) thematic maps of agricultural land in the Kalmyk territory of the USSR is evaluated It is shown that the information content of space images may vary according to the type of map being compiled for maps of the topographical features and uses of agricultural land, 70 percent of the data extracted from space images was useful, for maps of soil types, only 40 percent of the photographic information data was useful. I H

A85-37119
THE APPLICATION OF COMPUTERIZED SPACE IMAGE PROCESSING TECHNIQUES TO DATA FROM LARGE SCALE AERIAL SURVEYS OF FORESTS [ISPOL'ZOVANIE MATERIALOV KRUPNOMASSHTABNOI AEROFOTOS'EMKI LESA PRI AVTOMATIZIROVANNOM DESHIFRIROVANII KOSMICHESKIKH SNIMKOV]
L A KUZENKOV, N A APARINOVA, and A V STARCHENKO (Vsesoiuznoe Aerofotolesoustroitel'noe Ob'edinenie Lesproekt, Moscow, USSR) Issledovanie Zemli iz Kosmosa (ISSN 0205-9614), Mar -Apr 1985, p 90-96 In Russian

A step-wise numerical technique to process large scale aerial survey data for forestry applications is described The method is based on the SNIMOK-DANNYE computer system for processing photographic data obtained by satellite A block diagram illustrating the step-wise processing procedure is given and the statistical correlation used to match forest features with suitable deciphering indicators is described The technique has been used to process photographic data from 30 different aerial surveys of forest land in Iakutsk, USSR, and was found to be practical for widespread use I H

A85-37730
METEOROLOGICAL SATELLITE DATA USEFUL FOR AGROCLIMATE
P K RAO, J D TARPLEY, R A SCOFIELD, and J F MOSES (NOAA, Satellite Applications Laboratory, Washington, DC) IN Conference on Satellite/Remote Sensing and Applications, Clearwater Beach, FL, June 25-29, 1984, Preprints Boston, MA, American Meteorological Society, 1984, p 15-21 refs

The meteorological products developed by NOAA/NESDIS for agricultural users on the basis of data from satellite sensors are characterized and illustrated with maps, graphs, and sample images These products include vegetation-index maps using the normalized difference of NOAA AVHRR channels 1 and 2, surface insolation maps based on GOES data, canopy, shelter, dewpoint and daily-extreme temperatures derived from HIRS/2 and TOVS data, and precipitation estimates based on AVHRR cloud-cover data T K

A85-37742* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
A CASE STUDY ON THE APPLICATION OF GEOSYNCHRONOUS SATELLITE INFRARED DATA TO ESTIMATE SOIL MOISTURE
R H WOODWARD (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, General Software Corp, Landover, MD), P J WETZEL, and D ATLAS (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) IN Conference on Satellite/Remote Sensing and Applications, Clearwater Beach, FL, June 25-29, 1984, Preprints Boston, MA, American Meteorological Society, 1984, p 80-85 refs

The use of GOES IR temperature data to estimate soil moisture content is discussed and demonstrated, modifying the procedure proposed by Wetzel et al (1984) to provide for incorporation of independent measurements of vegetation biomass, geostrophic wind speed, and surface dewpoint Data acquisition, processing, and the statistical approach employed are described, data for Kansas and Nebraska during a six-day period in July 1978 are analyzed, and a statistical relationship between observed surface temperature and antecedent precipitation index is established The results are presented in tables, graphs, and maps, and the regression procedure is found to predict antecedent precipitation with statistically significant precision T K

A85-37868
SANTA ANA AIRFLOW OBSERVED FROM WILDFIRE SMOKE PATTERNS IN SATELLITE IMAGERY
J SVEJKOVSKY (California, University, La Jolla, CA) Monthly Weather Review (ISSN 0027-0644), vol 113, May 1985, p 902-906 refs
(Contract NOAA-NA-80AAD00120)

Strong mountain downslope winds over southern California known as 'Santa Ana' bring dry inland air through the coastal region, posing a serious wildfire hazard Between November 26 and 30, 1980 several large brushfires raged out of control south of Los Angeles The smoke plume from the fires was visible in NOAA 6 AVHRR images and was used to trace the seaward extent of the Santa Ana influence The smoke followed the 700 mb air flow pattern and was detectable in the images up to 1100 km from its source Author

A85-37958
CAPABILITY OF BHASKARA-II SATELLITE MICROWAVE RADIOMETER BRIGHTNESS TEMPERATURE DATA TO DISCRIMINATE SOIL MOISTURE CONDITIONS OF INDIAN LANDMASS
K S RAO, P VENKATACHALAM, A SOWMYA (Indian Institute of Technology, Bombay, India), A K KANDYA, and T J MAJUMDAR (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 91-96 refs

The capability of the brightness temperature data acquired by Bhaskara-II satellite microwave radiometers, operating at 19 35, 22 235, and 31 4 GHz, to discriminate various soil-moisture conditions of Indian land mass and to study atmospheric phenomena is demonstrated The data obtained in February 1983 extends from the northern Himalayan snow regions to the southern sea regions It is shown that large-scale assessment of soil moisture is possible to a limited extent Histograms of the data of the radiometers are presented M D

A85-37966
ESTIMATING CANOPY COVER IN DRYLANDS WITH LANDSAT MSS DATA
K OLSSON (Lunds Universitet, Lund, Sweden) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 161-164 refs

The possibilities of using Landsat MSS data for wood resources monitoring are evaluated The relationship between canopy cover, measured in 32 test plots through air-photo interpretation, and spectral characteristics of the corresponding areas is studied in a semi-arid savannah environment in Kordofan, Sudan The values are correlated with multitemporal Landsat raw data and manipulated data It is shown that the highest correlation coefficients are obtained between crown cover and MSS data recorded during the dry season and that the negative correlations between nIR (MSS 6 and MSS 7) and crown cover are striking To establish a relationship between woody wet weight and crown diameter, destructive measurements of woody biomass are carried out
M D

A85-37967
REMOTE SENSING FOR DROUGHT IMPACT ASSESSMENT - A STUDY OF LAND TRANSFORMATION IN KORDOFAN, SUDAN
U HELLDEN (Lunds Universitet, Lund, Sweden) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 165-168 refs

A85-37980* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
A GEOREFERENCED LANDSAT DIGITAL DATABASE FOR FOREST INSECT-DAMAGE ASSESSMENT
D L WILLIAMS, R F NELSON, and C L DOTTAVIO (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, MD) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 643-656 refs

In 1869, the gypsy moth caterpillar was introduced in the U S in connection with the experiments of a French scientist Throughout the insect's period of establishment, gypsy moth populations have periodically increased to epidemic proportions For programs concerned with preventing the insect's spread, it would be highly desirable to be able to employ a survey technique which could provide timely, accurate, and standardized assessments at a reasonable cost A project was, therefore, initiated with the aim to demonstrate the usefulness of satellite remotely sensed data for monitoring the insect defoliation of hardwood forests in Pennsylvania A major effort within this project involved the development of a map-registered Landsat digital database A complete description of the database developed is provided along with information regarding the employed data management system
G R

A85-37981* Pan American Univ , Edinburg, Tex
A TEST OF THE SUITS VEGETATIVE-CANOPY REFLECTANCE MODEL WITH LARS SOYBEAN-CANOPY REFLECTANCE DATA
J E CHANCE and E W LEMASTER (Pan American University, Edinburg, TX) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 665-672 refs
(Contract NSG-9033, NAG9-61)

The Suits vegetative-canopy reflectance model is tested with an extensive set of field reflectance measurements made by the Laboratory for Application of Remote Sensing (LARS) for soybean canopies The model is tested for the full hemisphere of observer directions as well as the nadir direction The results show moderate agreement for the visible channels of the Landsat MSS and poor agreement in the near-infrared channel of Landsat MSS An analysis of errors is given
Author

A85-38273* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
DIURNAL MOVEMENTS OF COTTON LEAVES EXPRESSED AS THERMODYNAMIC WORK AND ENTROPY CHANGES
J B SCHUTT, D S KIMES (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, MD), and W W NEWCOMB (RMS Technologies, Inc , Landover, MD) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 51, June 1985, p 697-702 refs

It is pointed out that some important agricultural crops show heliotropic leaf movements In these species, the proclivity of leaves to orient either perpendicularly or parallel or in some combination of these positions with respect to the sun is controlled by the leaf turgor and the availability of water Such an orientational response is particularly noticeable for cotton Schutt et al (1985) have detailed leaf trajectories using three angles The present investigation applies the three-angle representation to leaf trajectory mapping and to the calculation of the phase angle 'gamma' between the individual leaf normals and the solar direction Using gamma, the thermodynamic work and entropy functions are evaluated and used to distinguish between the behavior of water-stressed and well watered cotton canopies
G R

A85-38389* Kansas State Univ , Manhattan
ESTIMATION OF TOTAL ABOVE-GROUND PHYTOMASS PRODUCTION USING REMOTELY SENSED DATA
G ASRAR, E T KANEMASU (Kansas State University of Agriculture and Applied Science, Manhattan, KS), R D. JACKSON, and P J PINTER, JR (U S Department of Agriculture, Water Conservation Laboratory, Phoenix, AZ) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 211-220 refs
(Contract NAS9-16457)

Remote sensing potentially offers a quick and nondestructive method for monitoring plant canopy condition and development In this study, multispectral reflectance and thermal emittance data were used in conjunction with micrometeorological data in a simple model to estimate above-ground total dry phytomass production of several spring wheat canopies The fraction of absorbed photosynthetic radiation (PAR) by plants was estimated from measurements of visible and near-infrared canopy reflectance Canopy radiation temperature was used as a crop stress indicator in the model Estimated above-ground phytomass values based on this model were strongly correlated with the measured phytomass values for a wide range of climate and plant-canopy conditions
Author

A85-38390* Cornell Univ , Ithaca, N Y
SPECTRAL ESTIMATORS OF ABSORBED PHOTOSYNTHETICALLY ACTIVE RADIATION IN CORN CANOPIES
K P GALLO (Cornell University, Ithaca, NY, Purdue University, West Lafayette, IN), C S T DAUGHTRY (Purdue University, West Lafayette, IN), and M E BAUER (Minnesota, University, St Paul, MN, Purdue University, West Lafayette, IN) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 221-232 Previously announced in STAR as N85-16242 refs
(Contract NAS9-16528)

Most models of crop growth and yield require an estimate of canopy leaf area index (LAI) or absorption of radiation Relationships between photosynthetically active radiation (PAR) absorbed by corn canopies and the spectral reflectance of the canopies were investigated Reflectance factor data were acquired with a Landsat MSS band radiometer From planting to silking, the three spectrally predicted vegetation indices examined were associated with more than 95 percent of the variability in absorbed PAR The relationships developed between absorbed PAR and the three indices were evaluated with reflectance factor data acquired from corn canopies planted in 1979 through 1982 Seasonal cumulations of measured LAI and each of the three indices were associated with greater than 50 percent of the variation in final grain yields from the test years Seasonal cumulations of daily absorbed PAR were associated with up to 73

percent of the variation in final grain yields Absorbed PAR, cumulated through the growing season, is a better indicator of yield than cumulated leaf area index Absorbed PAR may be estimated reliably from spectral reflectance data of crop canopies R S F

A85-38391* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
SATELLITE REMOTE SENSING OF TOTAL HERBACEOUS BIOMASS PRODUCTION IN THE SENEGALESE SAHEL - 1980-1984
C J TUCKER (NASA, Goddard Space Flight Center, Laboratory for Terrestrial Physics, Greenbelt, MD), C L VANPRAET, M J SHARMAN, and G VAN ITTERSUM (United Nations, Food and Agriculture Organization, Dakar, Senegal) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 233-249 refs

A85-38393* Stanford Univ , Calif
INFLUENCE OF ROCK-SOIL SPECTRAL VARIATION ON THE ASSESSMENT OF GREEN BIOMASS
C D ELVIDGE and R J P LYON (Stanford University, Stanford, CA) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 265-279 Research supported by the Shell Companies Foundation and NASA refs

A comparison of how n-spaced and ratio-based vegetation indices respond to rock and soil spectral variation is made, using a set of ground-based reflectance spectra and airborne Thematic Mapper imagery of the Virginia Range, NV The influence of variations in rock-soil brightness on ratio-based vegetation indices is also discussed It is shown that of all the vegetation indices tested, the perperdicular vegetation index is the most appropriate for use in multispectral imagery of arid and semiarid regions where there is a wide variation in substrate characteristics M D

A85-38394* Purdue Univ , Lafayette, Ind
CHANGES IN SPECTRAL PROPERTIES OF DETACHED BIRCH LEAVES
C S T DAUGHTRY and L L BIEHL (Purdue University, West Lafayette, IN) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 281-289 refs
(Contract NAS9-16528)

A study conducted in order to determine the rate of changes in spectral properties of detached leaves and to evaluate the effectiveness of low temperature and cytokinins for delaying the changes, is examined For five minutes, leaves from red birch are immersed in water or 0 001 M BAP, and then stored in plastic bags in the dark at either 5 or 25 C Using a spectroradiometer and an integrating sphere, total directional-hemispherical reflectance and transmittance of the adaxial surface of the leaves are measured over the 400-1100 nm wavelength region The results indicate that for leaves stored at 5 C for one week, the changes in the spectral properties are less than 5 percent of the initial values, whereas storage at 25 C promotes rapid senescence and large changes in the spectral properties It is shown that low temperature is more effective than BAP in delaying senescence M D

A85-38395* Environmental Research Inst of Michigan, Ann Arbor
A TM TASSELED CAP EQUIVALENT TRANSFORMATION FOR REFLECTANCE FACTOR DATA
E P CRIST (Michigan, Environmental Research Institute, Ann Arbor, MI) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 301-306 refs
(Contract NAS9-16538)

A transformation of TM-waveband reflectance-factor data which provides features related as directly as possible to the corresponding TM Tasseled Cap brightness, greennes, and wetness features is presented The reflectance factor transformation is based on spectrometer data integrated over the prelaunch composite-detector response functions of the Landsat-4 Thematic Mapper A description, in general terms, of the approach for adjusting the transformation matrix to other types of reflectance factor data (different instrument or band response) is given M D

A85-38704
OPERATIONAL PLANNING FOR A REMOTE-SENSING SPACE SYSTEM [K VOPROSU PLANIROVANIIA RABOTY KOSMICHESKOI SISTEMY IPRZ]
IU G SIMONOV, T A VOROBEVA, and N A ROZHDESTVENSKAIA IN. Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 14-19 In Russian

An approach to establishing a schedule of operation for a space system intended for crop inventory is described Consideration is given to methods for collecting the information that defines the areas in need of space system services, the regions of the Soviet Union that are characterized by a specific combination of crop species are identified, and their relative value is assessed For each region a temporal characteristic exists which can be used as a basis for a calendar-type system schedule The parameters most descriptive of the major species are defined for all stages of their development and for ground-based, aero-visual, and aerophotometric methods L T

A85-38708
A PRELIMINARY METHOD FOR COMPLEX AEROVISUAL AND GROUND-BASED SUBSATELLITE OBSERVATIONS OF AGROPHYTOCENOSIS STATUS (THROUGH THE EXAMPLE OF WINTER WHEAT) [PREDVARITEL'NAIA METODIKA KOMPLEKSNYKH AEROVIZUAL'NYKH I NAZEMNYKH PODSPUTNIKOVYKH NABLIUDENII ZA SOSTOIANIEM AGROFITOTSENOZOV /NA PRIMERE POSEVOV OZIMOI PSHENITSY/]
E A VASILEV, P M KARIAGIN, and E B POSPELOVA IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 40-49 In Russian refs

A85-38719
ASSESSMENT OF THE STUDY AND MAPPING OF PASTURES IN SEMIARID ZONES USING REMOTE SENSING METHODS [K OTSENKE IZUCHENIIA I KARTOGRAFIROVANIIA PRIRODNYKH KORMOVYKH UGODII POLUPUSTYNNOI ZONY DISTANTSIONNYMI METODAMI]
N A SEMENOV, N V BELIAEVA, and I A TROFIMOV IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 103-115 In Russian refs

A85-38809
REMOTE SENSING OF THE AGROCHEMICAL PROPERTIES OF SOILS
K IA KONDRATEV (Akademiia Nauk SSSR, Institut Ozerovedeniia Leningrad, USSR), V V KOZODEROV (Akademiia Nauk SSSR, Moscow, USSR), and P P FEDCHENKO (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Sel'skokhoziastvennoi Meteorologii, Moscow, USSR) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 62-64 refs

Pokrovsky (1929) has conducted an investigation regarding the correlation existing between the spectral reflectivities of soils and their humus content He found that the spectral reflectivity of soil depended on its humus content according to an exponential relationship The conclusions reported by Pokrovsky could be verified with the aid of experimental data obtained by Tolchelnikov (1960) Additional calculations have shown that for cases involving humus contents in the range from 5 to 6 percent the obtained correlation can be replaced by a linear correlation The present

investigation is concerned with an experiment which had the objective to establish a quantitative correlation between soil reflectivity parameters and the soil humus content The experiment involved measurements conducted with a spectrophotometer, taking into account samples consisting of humus-containing soil and soil-forming rock particles Measurements conducted with the aid of satellite and aircraft are also considered G R

A85-38812* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
COLLECTION OF IN SITU FOREST CANOPY SPECTRA USING A HELICOPTER - A DISCUSSION OF METHODOLOGY AND PRELIMINARY RESULTS
D L WILLIAMS (NASA, Goddard Space Flight Center, Greenbelt, MD), C L WALTHALL (Nebraska, University, Lincoln, NE), and S N GOWARD (Maryland, University, College Park, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 94-106 refs

An important part of fundamental remote sensing research is based on the measurement and analysis of spectral reflectance from earth surface materials in situ It has been found that for an effective analysis of the target of interest, different applications of remotely sensed data require spectral measurements from different portions of the electromagnetic spectrum It is pointed out that the detailed spectral reflectance characteristics of forest vegetation are currently not well understood, particularly in the middle infrared wavelength region Details regarding the need for in situ forest canopy measurements are examined, taking into account certain difficulties arising in the case of satellite observations Because of these difficulties, the present paper provides a discussion of methodology and preliminary spectra based on an experiment to use a helicopter as an observing platform for in situ forest canopy spectra measurement G R

A85-38815
IDENTIFYING VEGETATIVE LAND USE CLASSES DURING EACH OF THE FOUR SEASONS ON AERIAL PHOTOGRAPHS AND LANDSAT IMAGERY IN COASTAL SOUTH CAROLINA
K O KELTON (Union Camp Corp , Bloomingdale, GA), W A SHAIN, and L E NIX (Clemson University, Clemson, SC) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 126-133 refs

A85-38820* Michigan State Univ , East Lansing
SPECTRAL RESPONSE CURVE MODELS APPLIED TO FOREST COVER-TYPE DISCRIMINATION
W D HUDSON and D P LUSCH (Michigan State University, East Lansing, MI) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 175-179
(Contract NGL-23-004-083)

The potential of remote sensing systems to provide a cost-effective inventory tool in the case of forest resources is currently of interest to a variety of natural resources management agencies A number of studies have been performed regarding the use of Landsat data for mapping forest resources in Michigan The present paper is concerned with current research, which has been directed toward the development and evaluation of computer-implemented classifications for the identification and characterization of coniferous forest types in Michigan's northern Lower Peninsula Attention is given to the characteristic response curves from Landsat MSS data, spectral response curve models, and forest cover-type discrimination It is found that spectral response curve models can be used to evaluate and explain the characteristic spectral responses of coniferous forest types on a snow-covered, winter Landsat scene G R

A85-38828
AN ANALYSIS OF THE UTILITY OF LANDSAT THEMATIC MAPPER DATA AND DIGITAL ELEVATION MODEL DATA FOR PREDICTING SOIL EROSION
D B GESCH and B I NAUGLE (Murray State University, Murray, KY) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 260-265 refs

A85-38829
UTILITY OF SOME IMAGE ENHANCEMENT TECHNIQUES FOR RECONNAISSANCE SOIL MAPPING - A CASE STUDY FROM SOUTHERN INDIA
R S DWIVEDI (National Remote Sensing Center, Hyderabad, India) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 266-274

A85-38834
ROLE OF VEGETATION IN THE BIOSPHERE
D B BOTKIN (California, University, Santa Barbara, CA) and S W RUNNING (Montana, University, Missoula, MT) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 326-332 refs

The role of terrestrial vegetation in influencing energy, water, and biogeochemical cycles is examined An approach to the remote sensing research which is required in order to understand this role in the biosphere is discussed Remote sensing is used to classify major vegetation landscape units and to measure leaf area indexes which are correlated with net primary production and total biomass The ability to distinguish and map biomes by remote sensing is demonstrated for Landsat sensors M D

A85-38835* National Aeronautics and Space Administration Johnson (Lyndon B) Space Center,
TECHNIQUES FOR THE ESTIMATION OF LEAF AREA INDEX USING SPECTRAL DATA
G D BADHWAR (NASA, Johnson Space Center, Houston, TX) and S S SHEN (Lockheed Engineering and Management Services, Co , Inc , Houston, TX) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 333-338 NASA-supported research refs

Based on the radiative transport theory of a homogeneous canopy, a new approach for obtaining transformations of spectral data used to estimate leaf area index (LAI), is developed The transformations which are obtained without any ground knowledge of LAI show low sensitivity to soil variability, and are linearly related to LAI with relationships which are predictable from leaf reflectance, transmittance properties, and canopy reflectance models Evaluation of the SAIL (scattering by arbitrarily inclined leaves) model is considered Using only nadir view data, results obtained on winter and spring wheat and corn crops are presented M D

A85-38836* New York State Univ , Binghamton
ESTIMATION OF LEAF AREA INDEX FROM BIDIRECTIONAL SPECTRAL REFLECTANCE DATA BY INVERTING A CANOPY REFLECTANCE MODEL
N S GOEL (New York, State University, Binghamton, NY), K E HENDERSON, and D E PITTS (NASA, Johnson Space Center, Houston, TX) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 339-347 refs

A technique for estimating the leaf area index from bidirectional canopy reflectance (CR) data, in the infrared region, e g , in band 4 of a Thematic Mapper (TM), is described It involves inversion of a CR model which accurately represents the reflectance from the canopy A method for remotely collecting this CR data using an aircraft based TM is described The bidirectional CR's, for a black spruce (picea mariana) canopy, for 7 solar/view directions, as measured using this technique, are given. A very preliminary analysis of the data from a point of view of estimating LAI by inversion of a CR model is given This analysis suggests that for an acceptably accurate estimation of LAI, one will require bidirectional CR's for many more than 7 solar/view directions
Author

A85-38837
SPECTRAL ESTIMATES OF AGRONOMIC CHARACTERISTICS OF CROPS
C S T DAUGHTRY, K P GALLO, L L BIEHL (Purdue University, West Lafayette, IN), E T KANEMASU, G ASRAR (Kansas State University of Agriculture and Applied Science, Manhattan, KS), B L BLAD, J M NORMAN, and B R GARDNER (Nebraska, University, Lincoln, NE) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 348-356 refs

Data obtained with the aid of remote sensing from aerospace platforms could provide a basis for forecasting crop production The interaction of solar radiation with a crop as a function of the quantity of vegetation, the geometric configuration of the canopy, and solar illumination angles is discussed A study was conducted with the objective to determine the relationships of canopy characteristics to the reflectance factor of crops, taking into account also an integration of spectral and meteorological data for estimating crop yields Experiments involving the planting of corn and wheat were performed Attention is given to the relation of canopy reflectance to agronomy characteristics and the relation of spectral variables to yield The concept of combining spectral estimates of canopy characteristics with meteorological models is considered It is believed that such a concept should permit implementation of crop models for large areas G R

A85-38838
ASSESSING BIOPHYSICAL CHARACTERISTICS OF GRASSLAND FROM SPECTRAL MEASUREMENTS
R L WEISER, G ASRAR, G P MILLER, and E T KANEMASU (Kansas State University of Agriculture and Applied Science, Manhattan, KS) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 357-361

A85-38839* Technicolor Government Services, Inc , Moffett Field, Calif
REMOTE SENSING OF THE LEAF AREA INDEX OF TEMPERATE CONIFEROUS FORESTS
M A SPANNER, W ACEVEDO (Technicolor Government Services, Inc , Moffett Field, CA), K W TEUBER, S W RUNNING (Montana, University, Missoula, MT), D L. PETERSON, D H CARD (NASA, Ames Research Center, Moffett Field, CA), and D A MOUAT (Stanford University, Palo Alto, CA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 362-370 NASA-supported research refs

To estimate the one-sided leaf area index (LAI) of temperate coniferous forests using data acquired from the Daedalus Airborne Thematic Mapper, an empirical model is developed The study area follows an environmental gradient across west-central Oregon, where leaf development varies in response to temperature and moisture The relationship between the ratio of thematic-mapper simulator channels four and three and the leaf area index for selected closed canopy or fully stocked forest stands along the gradient is analyzed Results show that a good relationship exists between the LAI and the IR/red ratio for conifers and that a conifer species-independent asymptotic relationship is observed between LAI and near IR/red reflectance, with near radiometric saturation occurring at an LAI of about 7-8 M D

A85-38840
MONITORING GLOBAL VEGETATION DYNAMICS USING THE NOAA/AVHRR
D H GREEGOR, JR (Nebraska, University, Lincoln, NE) and J R NORWINE (Texas A & I University, Kingsville, TX) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 371-376 refs

NOAA/AVHRR satellite data have been shown to be useful for regional-scale monitoring of both spatial and temporal dynamics of vegetation, particularly when used in conjunction with climate data In this investigation, the authors have examined AVHRR Normalized Difference (ND) greenness values along an east-west transect across Texas and evaluated the ND gradient relative to the environmental change in climate and actual vegetation
Author

A85-38841
APPLIED GEOGRAPHIC INFORMATION SYSTEM TECHNIQUES FOR ASSESSING AGRICULTURAL PRODUCTION POTENTIAL IN DEVELOPING COUNTRIES - A HONDURAN CASE STUDY
D L MOKMA, S G WITTER, and G SCHULTINK (Michigan State University, East Lansing, MI) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 383-388 Research supported by the U S Agency for International Development refs

A85-38842
MODELLING FOREST BIOMASS ACCESSIBILITY IN SOUTH CAROLINA WITH DIGITAL TERRAIN DATA
L E NIX, W A SHAIN (Clemson University, Clemson, SC), and K O KELTON (Union Camp Corp , Bloomingdale, GA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 389-394 Research supported by the U S Department of Agriculture refs

A85-38843
DISCRIMINATION OF TROPICAL FOREST COVER TYPES USING LANDSAT MSS DATA
A SINGH (Reading, University, Reading, England) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 395-404 Research supported by the Forest Department of Manipur refs

N85-22440# Joint Publications Research Service, Arlington, Va
REMOTE SENSING USED FOR STUDY OF FOREST RESOURCES
A METALNIKOV, V YEZHKOV, and P MOROZ *In its* USSR Rept Space (JPRS-USP-85-001) p 67-72 4 Feb 1985 Transl into ENGLISH from Ekonomicheskaya Gaz (USSR), no 34, Aug 1984 p 16
Avail NTIS HC A07

Remote methods of probing the Earth from space have not only improved the operational efficiency and precision of work on forest management, but have also reduced the costs The effectiveness of using space photography was demonstrated in the recording and inventory of field and soil protective planting Ongoing changes in forest resources caused by human activity and natural factors are recorded by measurement of length, width, and areas of forests Damage done by forest fires and changes in the condition of damaged areas over time are monitored, development of burn areas into centers of forest pathology is predicted and prevented, and steps toward economic incorporation of damaged sectors and restoration of the forests are determined B G

N85-23190*# California Univ , Berkeley Remote Sensing Research Programs
CHARACTERIZATION OF LANDSAT-4 TM AND MSS IMAGE QUALITY FOR THE INTERPRETATION OF CALIFORNIA'S AGRICULTURAL RESOURCES
S D DEGLORIA and R N COLWELL *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 91-118 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(Contract NAS5-27377)
Avail NTIS HC A19/MF A01 CSCL 02C

The quality of LANDSAT-4 MSS and TM data was determined by analyzing TM spectral and spatial performance in terms of spectral variability of natural targets and the TM-ground instantaneous field-of-view (IFOV) variability in level and mountainous terrain, and by assessing the suitability of TM and MSS image products for characterizing renewable resourse features The TM data should be extremelly valuable for crop type and area proportion estimation, undating agricultural land use survey maps at 1 24,000 scale and smaller, field boundary definition, and determining the size and location of individual farmsteads Ongoing research activities are focused on making spectral and spatial analyses of both MSS and TM analytical film products The improved spectral, spatial, and radiometric quality of the TM data, should promote a renewed emphasis and interest in direct visual interpretation of these image products, both for updating and improving land stratification in support of resource inventory and for enhancing the image analyst's contribution to computer-assisted analysis procedures A R H

N85-23193*# National Aeronautics and Space Administration Earth Resources Labs , Bay St Louis, Miss
AN INITIAL ANALYSIS OF LANDSAT-4 THEMATIC MAPPER DATA FOR THE DISCRIMINATION OF AGRICULTURAL, FORESTED WETLANDS, AND URBAN LAND COVER
D A QUATTROCHI *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 131-152 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 08B

The capabilities of TM data for discriminating land covers within three particular cultural and ecological realms was assessed The agricultural investigation in Poinsett County, Arkansas illustrates that TM data can successfully be used to discriminate a variety of crop cover types within the study area The single-date TM classification produced results that were significantly better than those developed from multitemporal MSS data For the Reelfoot Lake area of Tennessee TM data, processed using unsupervised signature development techniques, produced a detailed classification of forested wetlands with excellent accuracy Even in a small city of approximately 15,000 people (Union City, Tennessee) TM data can successfully be used to spectrally distinguish specific urban classes Furthermore, the principal components analysis evaluation of the data shows that through photointerpretation, it is possible to distinguish individual buildings and roof responses with the TM A R H

N85-23198*# Delaware Univ , Newark Coll of Marine Studies
REMOTE SENSING OF COASTAL WETLANDS BIOMASS USING THEMATIC MAPPER WAVEBANDS
M A HARDISKY and V KLEMAS *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 151-270 Jan 1985 refs ERTS
(Contract NAS5-27580, NSF DAR-80-17836)
Avail NTIS HC A19/MF A01 CSCL 08B

Spectral data, simulating thematic mapper bands 3, 4 and 5 were gathered in salt and brackish marshes using a hand-held radiometer Simple regression models were developed equating spectral radiance indicies with total live biomass for S alterniflora in a salt marsh and for a variety of plant species in a brackish marsh Models were then tested and compared to harvest estimates of biomass In the salt marsh, biomass estimates from spectral data were similar to harvest biomass estimates during most of the growing season Estimates of annual net aerial primary productivity calculated from spectral data were within 21% of production estimated from harvest data During August, biomass estimates from spectral data in the brackish marsh were similar to biomass estimated by harvesting techniques but not always comparable at other times in the growing season A R H

N85-23201*# National Aeronautics and Space Administration Johnson (Lyndon B) Space Center,
THEMATIC MAPPER DATA QUALITY AND PERFORMANCE ASSESSMENT IN RENEWABLE RESOURCES/AGRICULTURE/REMOTE SENSING
R M BIZZELL and H L PRIOR *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 299-312 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(Contract PROJ AGRISTARS)
Avail NTIS HC A19/MF A01 CSCL 05B

Analysis of the early thematic mapper (TM) data indicate the TM sensor and associated ground processing are performing equal to the high expectations and within advertised specifications The overall TM system with improved resolution, together with additional and more optimumly placed spectral bands shows much promise for benefits in future analysis activities By selecting man-made features of known dimensions (e g , highways, airfields, buildings, and isolated water bodies), an assessment was made of the TM performance relative to the specified 30-meter (98-foot) resolution The increase of spatial resolution of TM (30 m) over MSS (80 M)

appears to be significant not only in resolving spectrally distinct classes that were previously undefinable but also in distinguishing within-field variability An important result of the early TM evaluation and pre-TM analyses was the development of an integrated system to receive LANDSAT-4 TM (as well as MSS) data and analyze the data via various approaches B G

N85-23206*# National Aeronautics and Space Administration Johnson (Lyndon B) Space Center,
PRELIMINARY EVALUATION OF TM FOR SOILS INFORMATION
D. R THOMPSON, K E HENDERSON, A G HOUSTON, and D E PITTS *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 359-368 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 08M

The capability of the LANDSAT TM for providing information for soil association maps and for detecting soil properties (variability within vegetated fields) was assessed using TM imagery of fields in Mississippi County, Arkansas that were planted with rice, cotton, and soybeans Results indicate that the TM bands are providing information that is related to the soil properties within the field Over large areas, these bands also appear to provide information that is related to the soil properties that are important to plant condition While these results are only an indication of the information that TM can provide, they do indicate the TM data--especially, the mid-TR and thermal bands--show the capability for separating vegetated soil landscapes on a broad basis The analysis at the field level with a growing crop also indicates that TM, with its additional and narrower bands and improved spatial and radiometric resolution is influenced by within field variability due to soils that has to be accounted for in the analysis of TM data A R H

N85-23213*# Kansas Univ Center for Research, Inc , Lawrence Remote Sensing Lab
THE MICROWAVE PROPAGATION AND BACKSCATTERING CHARACTERISTICS OF VEGETATION Final Report
F T ULABY, Principal Investigator and E A WILSON Dec 1984 231 p refs ERTS
(Contract NAG5-272)
(E85-10088, NASA-CR-175523, NAS 1 26 175523) Avail NTIS HC A11/MF A01 CSCL 20N

A semi-empirical model for microwave backscatter from vegetation was developed and a complete set of canope attenuation measurements as a function of frequency, incidence angle and polarization was acquired The semi-empirical model was tested on corn and sorghum data over the 8 to 35 GHz range The model generally provided an excellent fit to the data as measured by the correlation and rms error between observed and predicted data The model also predicted reasonable values of canopy attenuation The attenuation data was acquired over the 1 6 to 10 2 GHz range for the linear polarizations at approximately 20 deg and 50 deg incidence angles for wheat and soybeans An attenuation model is proposed which provides reasonable agreement with the measured data Author

N85-23233*# Tsukuba Univ (Japan) Environmental Research Center
ESTIMATION OF REGIONAL EVAPOTRANSPIRATION USING REMOTELY SENSED LAND SURFACE TEMPERATURE. PART 1: MEASUREMENT OF EVAPOTRANSPIRATION AT THE ENVIRONMENTAL RESEARCH CENTER AND DETERMINATION OF PRIESTLEY-TAYLOR PARAMETER
K KOTADA, S NAKAGAWA, K KAI, M M YOSHINO, K TAKEDA (Science and Technology Agency, Tokyo), and K SEKI (Science and Technology Agency, Tokyo) *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 99-114 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08H

In order to study the distribution of evapotranspiration in the humid region using remote sensing technology, the parameter (alpha) in the Priestley-Taylor model was determined The daily means of the parameter alpha = 1 14 can be available from summer to autumn and alpha = to approximately 2 0 in winter The results of the satellite and the airborne sensing done on 21st and 22nd January, 1983, are described Using the vegetation distribution in the Tsukuba Academic New Town, as well as the radiation temperature obtained by remote sensing and the radiation data observed at the ground surface, the evapotranspiration was calculated for each vegetation type by the Priestley-Taylor method The daily mean evapotranspiration on 22nd January, 1983, was approximately 0 4 mm/day The differences in evapotranspiration between the vegetation types were not detectable, because the magnitude of evapotranspiration is very little in winter Author

N85-23234*# Tsukuba Univ (Japan) Environmental Research Center
ESTIMATION OF REGIONAL EVAPOTRANSPIRATION USING REMOTELY SENSED LAND SURFACE TEMPERATURE. PART 2: APPLICATION OF EQUILIBRIUM EVAPORATION MODEL TO ESTIMATE EVAPOTRANSPIRATION BY REMOTE SENSING TECHNIQUE
K KOTODA, S NAKAGAWA, K KAI, M M YOSHINO, K TAKEDA (Science and Technology Agency, Tokyo), and K SEKI (Science and Technology Agency, Tokyo) *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 115-127 Feb 1985 refs Original contains color illustrations
Avail NTIS HC A09/MF A01 CSCL 08H

In a humid region like Japan, it seems that the radiation term in the energy balance equation plays a more important role for evapotranspiration then does the vapor pressure difference between the surface and lower atmospheric boundary layer A Priestley-Taylor type equation (equilibrium evaporation model) is used to estimate evapotranspiration Net radiation, soil heat flux, and surface temperature data are obtained Only temperature data obtained by remotely sensed techniques are used A R H

N85-23235*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
MICROWAVE REMOTE SENSING OF SOIL MOISTURE
T J SCHMUGGE *In its* Remote Sensing of Snow and Evapotranspiration p 129-148 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08M

Because of the large contrast between the dielectric constant of liquid water and that of dry soil at microwave wavelength, there is a strong dependence of the thermal emission and radar backscatter from the soil on its moisture content This dependence provides a means for the remote sensing of the moisture content in a surface layer approximately 5 cm thick The feasibility of these techniques is demonstrated from field, aircraft and spacecraft platforms The soil texture, surface roughness, and vegetative cover affect the sensitivity of the microwave response to moisture variations with vegetation being the most important It serves as an attenuating layer which can totally obscure the surface Research indicates that it is possible to obtain five or more levels of moisture discrimination and that a mature corn crop is the limiting vegetation situation Author

N85-23238*# Pennsylvania State Univ , University Park Dept of Meteorology
A METHOD FOR ESTIMATING SOIL MOISTURE AVAILABILITY Semiannual Report
T N CARLSON 22 Mar 1985 15 p refs
(Contract NAG5-184)
(NASA-CR-175606, NAS 1 26 175606) Avail NTIS HC A02/MF A01 CSCL 08M

A method for estimating values of soil moisture based on measurements of infrared surface temperature is discussed A central element in the method is a boundary layer model Although it has been shown that soil moistures determined by this method using satellite measurements do correspond in a coarse fashion to the antecedent precipitation, the accuracy and exact physical interpretation (with respect to ground water amounts) are not well known This area of ignorance, which currently impedes the practical application of the method to problems in hydrology, meteorology and agriculture, is largely due to the absence of corresponding surface measurements Preliminary field measurements made over France have led to the development of a promising vegetation formulation (Taconet et al , 1985), which has been incorporated in the model It is necessary, however, to test the vegetation component, and the entire method, over a wide variety of surface conditions and crop canopies Author

N85-23818*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
ORBITING MULTI-BEAM MICROWAVE RADIOMETER FOR SOIL MOISTURE REMOTE SENSING
J C SHIUE (NASA Goddard Space Flight Center) and R W LAWRENCE *In its* Large Space Antenna Systems Technol , 1984 p 73-85 Apr 1985 refs
Avail NTIS HC A20/MF A01 CSCL 08H

The effects of soil moisture and other factors on soil surface emissivity are reviewed and design concepts for a multibeam microwave radiometer with a 15 m antenna are described Characteristic antenna gain and radiation patterns are shown and losses due to reflector roughness are estimated M G

N85-24506*# Department of Agriculture, Columbia, Mo
SUPPLEMENT TO EVALUATION OF SATELLITE DERIVED ESTIMATES OF SOLAR RADIATION
G H SULLIVAN, V FRENCH, S K LEDUC, J L SEBAUGH, and W W WILSON Dec 1984 97 p Sponsored by NASA, USDA, Dept of Commerce, Dept of the Interior, and Agency for International Development Prepared in cooperation with NOAA, Columbia, Mo and Missouri Univ , Columbia ERTS
(Contract PROJ AGRISTARS)
(E85-10086, NASA-CR-175521, YM-15-00405, JSC-20241, NAS 1 26 175521) Avail NTIS HC A05/MF A01 CSCL 02C

Graphs and statistical tables are provided for each of the 23 stations which were analyzed in an effort to evaluate satellite derived estimates of solar radiation A R H

N85-24507*# Department of Agriculture, Columbia, Mo
EVALUATION OF SATELLITE DERIVED ESTIMATES OF SOLAR RADIATION
G H SULLIVAN, V FRENCH, S K LEDUC, J L SEBAUGH, and W W WILSON Dec 1984 50 p refs Sponsored by NASA, USDA, Dept of Commerce, Dept of the Interior, and Agency for International Development Prepared in cooperation with NOAA, Columbia, Mo and Missouri Univ , Columbia ERTS
(Contract PROJ AGRISTARS)
(E85-10087, NASA-CR-175522, YM-15-00404, JSC-20240, NAS 1 26 175522) Avail NTIS HC A03/MF A01 CSCL 02C

The reliability of satellite derived estimates of daily insolation is analyzed for twenty-three ground truth observations in the United States over the period March through September 1983 A selection of graphic and statistical comparisons is generated for each location Summarized results show the general level of reliability of these estimates Author

N85-24508*# National Aeronautics and Space Administration Goddard Inst for Space Studies, New York
ATLAS OF ARCHIVED VEGETATION, LAND-USE AND SEASONAL ALBEDO DATA SETS
E MATTHEWS Feb 1985 55 p refs Submitted for publication
(NASA-TM-86199, NAS 1 15 86199) Avail NTIS HC A04/MF A01 CSCL 08B

Global digital data bases of natural vegetation and land use were compiled, for use in climate studies, at 1 deg resolution from over 100 published sources A series of 6 data sets, derived from the original compilations, was prepared and archived on tape at the National Center for Atmospheric Research (NCAR) (Matthews, 1984) The first is a vegetation data set representing natural (pre-agricultural) vegetation based on the UNESCO classification system The second, derived from the land-use compilation, is a cultivation-intensity data set defining the areal extent of presently-cultivated land in the 1 deg cells The last four are integrated surface-albedo data sets (January, April, July, October) for snow-free conditions, incorporating natural-vegetation and cultivation characteristics from the vegetation and cultivation-intensity data sets Each of these data sets covers the entire surface of the earth They include non-zero data for permanent land only, including continental ice, water, including oceans and lakes, is zero The present report includes maps, presented by continent, of the complete archived data, with the exception of Antarctica Author

N85-25359# Joint Publications Research Service, Arlington, Va
USE OF SPACE PHOTOGRAPHIC INFORMATION TO MAP PLANT COVER Abstract Only
T V VERESHCHAKA, B V KRASNOPEVTSEVA, and V V USOVA *In its* USSR Rept Space (JPRS-USP-85-003) p 121 4 Mar 1985 Transl into ENGLISH from Izv Vysshikh Uch Zaved Geod i Aerofotosyemka (USSR), no 4, Jul -Aug 1984 p 99-106 Original language document announced as A85-11815
Avail NTIS HC A08/MF A01

The paper examines the compilation of vegetation maps on the basis of Salyut-5 remote sensing data Also considered are methodological questions pertaining to the interpretation of images of vegetation cover in the compilation of topographic survey maps Tables are presented, describing vegetation cover location and dynamics in various altitude zones (150 m to more than 2200 m) and the relationship with relief B J (IAA)

N85-26825# Joint Publications Research Service, Arlington, Va
MULTIPLE REGRESSION ANALYSIS OF PHOTOGRAPHIC IMAGE OF SOIL PROPERTIES Abstract Only
B V VINOGRADOV, C RIEDEL, and A N KAPTSOV *In its* USSR Rept Space (JPRS-USP-85-004) p 84 6 May 1985 Transl into ENGLISH from Dokl Akad Nauk SSSR (Moscow), v 278, no 5, Oct 1984 p 1274-1277
Avail NTIS HC A06

Surface and remote studies of the spectral properties of soils and characteristics of the photographic image on multizonal photographs were carried out in an aerospace test range in the GDR central plain An aerial survey was made with an MKF-6 camera, surface photographs of standard soil samples were taken in the same spectral intervals The experiments were carried out under natural conditions with diffuse illumination Only air-dried soil samples were used The optical density of the image of each soil and an optical wedge were measured on the negatives A target measuring 1 x 1 cm with 10,000 measured values was selected on the image of each soil and the mean optical density of the negative was then computed All measurements were scaled to the optical density of the positive image The correlation between the optical density of the positive photographic image D sub pos and the soil properties (humus content, iron oxides and carbonates) in the upper genetic soil horizon was measured The multiple regression equation and its derivatives are useful in interpreting aerospace images of soils B W

N85-26826# Joint Publications Research Service, Arlington, Va
IDENTIFICATION OF STRUCTURE OF SOIL-VEGETATION COVER USING AERIAL AND SPACE PHOTOGRAPHS Abstract Only
S M GOROZHANKINA and V D KONSTANTINOV *In its* USSR Rept · Space (JPRS-USP-85-004) p 84-85 6 May 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (Moscow), no 6, Nov - Dec 1984 p 42-52 Original language document was announced in IAA as A85-25656
Avail. NTIS HC A06

The paper describes a method for the identification and mapping of the tructure of the vegetation and soil cover of taiga landscapes on the basis of aerial and space photographs in the scale range from 1 10,000,000 to 1 15,000 Meteor-satellite photographs of western Siberia are used The main features of meta-, and macro-, meso-, and micro-structures are characterized B J (IAA)

N85-27320*# Kansas Univ Center for Research, Inc , Lawrence Remote Sensing Lab
MODELING THE BACKSCATTERING AND TRANSMISSION PROPERTIES OF VEGETATION CANOPIES Final Report
C T ALLEN (Sandia National Lab., Albuquerque, N Mex) and F T ULABY (Michigan Univ , Ann Arbor) Feb 1984 357 p refs ERTS
(Contract NAS9-15421)
(E85-10099, NASA-CR-171864, NAS 1 26 171864, RSL-TR-360F) Avail NTIS HC A16/MF A01 CSCL 02F

Experimental measurements of canopy attenuation at 10 2 GHz (X-band) for canopies of wheat and soybeans, experimental observations of the effect upon the microwave backscattering coefficient (sigma) of free water in a vegetation canopy, and experimental measurements of sigma (10 2 GHz, 50 deg, VV and VH polarization) of 30 agricultural fields over the growing season of each crop are discussed The measurements of the canopy attenuation through wheat independently determined the attenuation resulting from the wheat heads and that from the stalks An experiment conducted to simulate the effects of rain or dew on sigma showed that sigma increases by about 3 dB as a result of spraying a vegetation canopy with water. The temporal observations of sigma for the 30 agricultural fields (10 each of wheat, corn, and soybeans) indicated fields of the same crop type exhibits similar temporal patterns Models previously reported were tested using these multitemporal sigma data, and a new model for each crop type was developed and tested The new models proved to be superior to the previous ones Author

N85-27322*# Kansas Univ Center for Research, Inc , Lawrence Remote Sensing Lab
MICROWAVE MODEL PREDICTION AND VERIFICATIONS FOR VEGETATED TERRAIN
A K FUNG Jan 1985 63 p refs ERTS
(Contract NAS9-15421)
(E85-10102, NASA-CR-171863, NAS 1 26 171863) Avail NTIS HC A04/MF A01 CSCL 02F

To understand the scattering properties of a deciduous and a coniferous type vegetation scattering models were developed assuming either a disc type leaf or a needle type leaf The major effort is to calculate the corresponding scattering phase functions and then each of the functions is used in a radiative transfer formulation to compute the scattering intensity and consequently the scattering coefficient The radiative transfer formulation takes into account the irregular ground surface by including the rough soil surface in the boundary condition Thus, the scattering model accounts for volume scattering inside the vegetation layer, the surface scattering from the ground and the interaction between scattering from the soil surface and the vegetation volume The contribution to backscattering by each of the three scattering mechanisms is illustrated along with the effects of each layer or surface parameter The major difference between the two types of vegetation is that when the incident wavelength is comparable to the size of the leaf there is a peak appearing in the mid angular region of the backscattering curve for the disc type leaf whereas it is a dip in the same region for a needle type leaf M G

N85-27324*# Washington Univ , St Louis, Mo Dept. of Earth and Planetary Sciences.
SHUTTLE IMAGING RADAR-A (SIR-A) DATA ANALYSIS Final Report
R E. ARVIDSON 30 Dec 1983 25 p refs Prepared for JPL (Contract NAS7-100, JPL-956427)
(NASA-CR-175785, NAS 1 26 175785) Avail NTIS HC A02/MF A01 CSCL 17I

The utility of shuttle imaging radar (SIR-A) data was evaluated in several geological and environmental contexts For the Ozark Plateau of southern Missouri, SIR-A data were of little use in mapping structural features, because of generally uniform returns For western Illinois, little was to be gained in terms of identifying land use categories by examining differences between overlapping passes For southern Australia (Koonamore Station), information ion vegetation types that was not obtainable from LANDSAT MSS data alone was obtained Specifically, high SIR-A returns in the Australian site were found to correlate with locations where shrubs increase surface roughness appreciably The Australian study site results demonstrate the synergy of acquiring spectral reflectance and radar data over the same location and time Such data are especially important in that region, since grazing animals have substantially altered and are continuing to alter the distribution of shrublands, grasslands, and soil exposures Periodic, synoptic acquisition of MSS and SAR data would be of use in monitoring the dynamics of land-cover change in this environment A R H

N85-27545# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil)
COMPARATIVE STUDY OF THE DIGITAL ANALYSIS OF AREAS OF THE EARTH'S SURFACE PREPARED FOR PLANTING USING DIFFERENT CLASSIFICATION ALGORITHMS [ESTUDO COMPARATIVO DA ANALISE DIGITAL DE AREAS DE SOLO PREPARADO PARA PLANTIO UTILIZANDO DIFERENTES ALGORITMOS DE CLASSIFICACAO]
M A MOREIRA, G V DEASSUNCAO, A R FORMAGGIO, and T K DEMORAIS Nov 1984 13 p refs In PORTUGUESE, ENGLISH summary Presented at the 4th Reuniao Anual da SELPER, Santiago, Chile, 12-17 Nov 1984 Submitted for publication
(INPE-3359-PRE/637) Avail NTIS HC A02/MF A01

The single-cell, Maxver, and K-median classifications in soil areas prepared for planting were studied and the use of the UNITOT method with the results of automatic classification was verified The methodology consisted of a statistical study of classification analysis applied to alphanumeric maps The classifications studies all are part of the Interactive Multispectral Image Analysis System (Image-100) E A K

N85-28436# Michigan State Univ , East Lansing
AIRPHOTO INTERPRETATION OF VEGETATION AND LANDFORMS FOR SOIL MAPPING
9 Nov 1984 127 p refs Presented at the Soil Sci Workshop, Higgins Lake, Mich , 5-9 Nov 1984
Avail NTIS HC A07/MF A01

Various aspects of the interpretation of aerial photographs of vegetation and landform for soil mapping are discussed Photographic sensors, stereo-viewing, photometric size determination color infrared photography and color infrared films are among the topics covered R J F

02

ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES

Includes land use analysis, urban and metroplitan studies, environmental impact, air and water pollution, geographic information systems, and geographic analysis

A85-30737
LAND-USE SURVEY OF IDUKKI DISTRICT
B SAHAI, J S PARIHAR, S R NAYAK, T P SINGH, M V MULEY, C B TIWARI, V TAMILARASAN, D M SHENDE (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), T V SAMUEL, C V THOMAS (Kerala State Land-Use Board, Trivandrum, India) et al International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 507-515

The preparation of a detailed land-use plan for the Idukki District in India is discussed The project which uses color-infrared and black-and-white aerial photography has the following objectives (1) the identification and mapping of areas under various land uses, (2) the study of geomorphological features and identification of potential ground-water areas, and (3) the identification of areas requiring soil conservation and reclamation measures The land-use categories which are mapped and subclassified are agriculture, forest, wasteland, bodies of water, and public use The major findings of the study indicate a reduction in the area under the forest and the existence of a large area under wasteland Geomorphological maps are prepared and show slope, relief, drainage, and vegetation, and when used with structural maps, potential groundwater areas are identified A classification accuracy of 86 percent for land-use maps and a slope estimation accuracy of 72 percent are obtained The locational/positional accuracy of the land features is found to be 50-150 m on the ground It is shown that the visual interpretation of Landsat images results in the identification of nine land-cover classes, while digital analysis enables the identification of twelve land-cover classes M D

A85-30738
LAND-USE AND LAND-COVER MAPPING AND CHANGE DETECTION IN TRIPURA USING SATELLITE LANDSAT DATA
N C GAUTAM and G CH CHENNAIAH (National Remote Sensing Agency, Hyderabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 517-528 refs

A85-30739
URBAN CHANGE DETECTION AND LAND-USE MAPPING OF DELHI
D M GUPTA and M K MUNSHI (Survey of India, New Delhi, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 529-534 refs

Today urban change detection is considered vital for monitoring the growth of an urban complex Such a change-detection system must essentially make use of the data available from conventional sources as well as that derived through remote sensing In this study, which was conducted as an end-to-end experiment under the national natural resources management system program in India, an attempt was made to utilize this concept in monitoring the changes in Delhi, the capital city of India, during the period 1959-1980 The analysis was undertaken mainly on the basis of the data available in guide maps The utility of aerial photography and Landsat imageries for such studies was evaluated A simple digital urban information system was also developed Author

A85-31882
REMOTE SENSING OF THE ATMOSPHERIC AEROSOL FROM SPACE [KOSMICHESKOE DISTANTSIONNOE ZONDIROVANIE ATMOSFERNOGO AEROZOLIA]
K IA KONDRATEV, A A GRIGOREV, O M POKROVSKII, and E V SHALINA Leningrad, Gidrometeoizdat, 1983, 216 p In Russian refs

Experimental and theoretical results are reviewed concerning the application of remote sensing technology to the study of the atmospheric aerosol Attention is given to the deduction of atmospheric pollution conditions on the basis of remote sensing imagery from space, and the classification of smoke-laden and dust-laden atmospheres Numerical techniques for estimating atmospheric aerosol content are described, including empirical correlations and inverse solutions to atmospheric optics problems Difficulties in evaluating the information content of remote sensing data for the aerosol and minor gas components of the atmosphere are also discussed I H

A85-32110
REMOTELY PILOTED AIRCRAFT FOR SMALL FORMAT AERIAL PHOTOGRAPHY
G F TOMLINS and M J MANORE (B C Research, Vancouver, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 127-136 Research supported by the Ministry of Universities, Science and Communications of British Columbia refs

The use of Remotely Piloted Aircraft (RPA) to acquire small-format aerial photography is discussed Project AERIE (Airborne Equipment for Remote Imaging of the Environment), a research and development program which examines the feasibility, advantages, and limitations of using RPA systems in civil remote-sensing applications is described A 2 7-m span fixed-wing model aircraft which carries a remotely operated 35-mm camera system is used as a platform for small-format aerial photography The RPA is used in a variety of applications including forestry, pollution detection, wildlife-habitat monitoring, real estate and publicity, and shoreline mapping The results obtained during demonstration studies undertaken in 1982 are reported Some advantages of RPA include low-noise levels, and low-speed and low-altitude capabilities The development of a new airframe and command system which provides a solution to the most severe operational limitations is considered M D

A85-32127
MAPPING OF LAND/SOIL DEGRADATION USING MULTISPECTRAL DATA
L VENKATARATNAM (National Remote Sensing Agency, Hyderabad, India) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 421-429 refs

Applications of Landsat MSS data for mapping land/soil undergoing various forms of erosion in India are described The main erosive processes are salinity/alkalinity, shifting cultivation, ravine growth, surface flooding, waterlogging and high water tables It has been proven that salt enhancements increase the surface reflectance Monsoon-waterlogged lands exhibit a characteristic reflectance when dry Sand dunes are readily visible with MSS sensors, which also delineate flooded gullies and red soils (hard to penetrate) The MSS data have already identified seaside areas which have been successfully reclaimed M S K

A85-32137
MONITORING EARTH RESOURCE AND ENVIRONMENTAL CHANGE - SOME LIMITATIONS AND POTENTIALS OF SATELLITE DATA
M A CLOUGH (Systems Engineering Associates, Ltd , Baden, Ontario, Canada), K S LANGLEY, A K MCQUILLAN, and E SHAW (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 591-605.

The necessary enhancements in the instrumental capabilities and number of remote sensing satellites to meet the needs for more thorough monitoring of resources and environmental changes are discussed Attention is focused on the potential benefits offered by the visual and near-IR (VIR) bands, which have high spectral and spatial resolution The data would serve for monitoring sea ice movement, forest growth and depletion, crop and soil conditions and hydrological phenomena Cloud cover statistics based on data taken during the presence of two Landsat spacecraft on orbit revealed the enhancements of image accuracy available with more than one functional satellite A major bottleneck which must be overcome in any case is ensuring that the remotely sensed images are distributed in a timely manner and matched with information needs and accuracy The shear volume of data would need to be filtered to extract and limit the formation conveyed, yet keep the images in the same format from scene to scene for particular users M S K

A85-33557* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
AN EVALUATION OF SIMULATED THEMATIC MAPPER DATA AND LANDSAT MSS DATA FOR DISCRIMINATING SUBURBAN AND REGIONAL LAND USE AND LAND COVER
D L TOLL (NASA, Goddard Space Flight Center, Greenbelt, MD) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 50, Dec 1984, p 1713-1724 refs

An airborne multispectral scanner, operating in the same spectral channels as the Landsat Thematic Mapper (TM), was used in a region east of Denver, CO, for a simulation test performed in the framework of using TM to discriminate the level I and level II classes It is noted that at the 30-m spatial resolution of the Thematic Mapper Simulator (TMS) the overall discrimination for such classes as commercial/industrial land, rangeland, irrigated sod, irrigated alfalfa, and irrigated pasture was superior to that of the Landsat Multispectral Scanner, primarily due to four added spectral bands For residential and other spectrally heterogeneous classes, however, the higher resolution of TMS resulted in increased variability within the class and a larger spectral overlap L T

A85-34534
GEOGRAPHY IN THE SPACE AGE
R SMITH (Rochester, University, Rochester, NY) Space Education (ISSN 0261-1813), vol 1, May 1985, p 401-403.

Landsat imagery provides a worldwide terrestrial landform data base which can support geographers in assessing current effects of human activities and in making predictions of further changes Drainage systems are recorded on a synoptic scale by Landsat Fluvial landforms, soil erosion and agricultural patterns can be identified, as can flooding and human response to natural hazards Sample images are presented of the east slope of the Himalayas, the Rhone valley and the Mississippi delta, and examples are given of drainage basin, drainage basin hydrology, and hydrography plots which can be derived from the imagery M S K

A85-36282
MONITORING ENVIRONMENTAL RESOURCES THROUGH NOAA'S POLAR ORBITING SATELLITES
J C HOCK (NOAA, National Environmental Satellite Service, Washington, DC) ITC Journal (ISSN 0303-2434), no 4, 1984, p 263-268

NOAA's Assessment and Information Services Center (AISC) integrates data from NOAA's polar orbiting and geo-stationary satellites, geographic information, agronomic models and economic models to monitor land and marine resources Climatic assessments on food security for developing countries in the tropics include weekly rainfall/weather analyses and climatic impact assessment models for more than 400 agroclimatic regions The results of these assessments are used in an 'early warning system' of impending crop failures Agriculture monitoring programmes in Africa provided advanced warning of the crop failures which are now effecting the Sahel and east African countries and parts of southern Africa Experimental marine monitoring is being carried out in the United States and a special programme is being developed to aid the tuna fishing industry in the Philippines, The AVHRR data are also useful for monitoring deforestation and desert encroachment Author

A85-36990
REMOTE SENSING IN CIVIL ENGINEERING
T J M KENNIE, ED and M C MATTHEWS, ED (Surrey, University, Guildford, England) Glasgow/New York, Surrey University Press/Halsted Press, 1985, 371 p No individual items are abstracted in this volume

A text containing all the necessary information for the location and interpretation of remote sensing images is presented The general topics addressed include remote sensing photographic systems, remote sensing scanning systems, digital processing of remote sensing data, remote sensing in civil engineering practice, remote sensing and topographic mapping, and interpretation of Landsat images for regional planning studies Also considered are interpretation of aerial photographs for site investigations, remote sensing for highway engineering projects in developing countries, environmental engineering applications of thermal infrared imagery, and remote sensing and water resource engineering C D

A85-37955
LANDSAT DATA FOR POPULATION ESTIMATES - APPROACHES TO INTER-CENSAL COUNTS IN THE RURAL SUDAN
M STERN (Lunds Universitet, Lund, Sweden) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 69-73 refs

A85-38274* California Univ , Santa Barbara
PILOT LAND DATA SYSTEM
J E ESTES, J L STAR (California, University, Santa Barbara, CA), P J CRESSY (NASA, Goddard Space Flight Center, Greenbelt, MD), and M DEVIRIAN (NASA, Washington, DC) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 51, June 1985, p 703-709 NASA-sponsored research refs

The full realization of the potential of satellite remote sensing would require the utilization of information systems which are currently not available However, technological advances make it now possible to design a data system for meeting the land scientists' most critical information needs A working group has been assembled to examine the need for a Pilot Data System (PLDS) The pilot program is to establish a limited-scale, distributed information system to explore approaches to satisfy the needs of the land science research community Aspects and objectives considered by the working group are discussed, taking into account science scenarios, required functions, the characteristics of a land data system, and questions of pilot land data system development G R

A85-38705
GEOGRAPHIC REGIONALIZATION AND THE PROBLEMS RELATED TO SPACE-BASED MONITORING [GEOGRAFICHESKOE RAIONIROVANIE I ZADACHI KOSMICHESKOGO MONITORINGA]
I I NEVIAZHSKII, T A VOROBEVA, and N A ROZHDESTVENSKAIA IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 19-22 In Russian refs

Agricultural regionalization of the Soviet Union is performed in the contex of territorial and functional organization of the central system of space data retrieval and processing This is done by conducting a structural-textural analysis of maps and remote sensing data Intermediate thematic maps have been compiled, on their basis a final region map on a scale of 1 8,000,000 is established Finally, consideration is given to the main objectives of monitoring from space and the problems associated with particular agricultural regions L T

A85-38706
THE USE OF METEOR SATELLITE IMAGES FOR GEOGRAPHIC REGIONALIZATION OF THE SOVIET UNION [ISPOL'ZOVANIE SNIMKOV S ISZ SISTEMY 'METEOR' DLIA GEOGRAFICHESKOGO RAIONIROVANIIA TERRITORII SSSR]
N A EVLANOVA, E B LEVINA, and G V MURASHKINTSEVA IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 22-28 In Russian refs

Black-and-white images retrieved from the Meteor satellite, with resolution near 0 8-1 1 micron, are used for agrigultural regionalization of the Soviet Union with the objective of monitoring agricultural species from space Regional maps with scales of 1 1,500,000 to 1 10,000,000 are used The role of natural and anthropogenic factors forming the structural-textural features of the territory is emphasized, these factors include geological-geomorphological structure, anthropogenic effects, and vegetation features It is pointed out that structural-textural characteristics of low-resolution and medium-resolution images differ insignificantly, often rendering low-resolution imagery more practical than high-resolution imagery L T

A85-38811* Maryland Univ , College Park
USE OF THE TM TASSELED CAP TRANSFORM FOR INTERPRETATION OF SPECTRAL CONTRASTS IN AN URBAN SCENE
S N GOWARD (Maryland, University, College Park, MD) and S W WHARTON (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 84-91 refs
(Contract NCC5-26)

Investigations are being conducted with the objective to develop automated numerical image analysis procedures In this context, an examination is performed of physically-based multispectral data transforms as a means to incorporate a priori knowledge of land radiance properties in the analysis process A physically-based transform of TM observations was developed This transform extends the Landsat MSS Tasseled Cap transform reported by Kauth and Thomas (1976) to TM data observations The present study has the aim to examine the utility of the TM Tasseled Cap transform as applied to TM data from an urban landscape The analysis conducted is based on 512 x 512 subset of the Washington, DC November 2, 1982 TM scene, centered on Springfield, VA It appears that the TM tasseled cap transformation provides a good means to explain land physical attributes of the Washington scene This result provides a suggestion regarding a direction by which a priori knowledge of landscape spectral patterns may be incorporated into numerical image analysis G R

A85-38816* New Orleans Univ , La
ANALYSIS METHODS FOR THEMATIC MAPPER DATA OF URBAN REGIONS
S C WANG (New Orleans, University, New Orleans, LA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 134-143 Research supported by the University of New Orleans and NASA refs

Studies have indicated the difficulty in deriving a detailed land-use/land-cover classification for heterogeneous metropolitan areas with Landsat MSS and TM data The major methodological issues of digital analysis which possibly have effected the results of classification are examined In response to these methodological issues, a multichannel hierarchical clustering algorithm has been developed and tested for a more complete analysis of the data for urban areas Author

A85-38822
ISSUES IN DESIGNING GEOGRAPHIC INFORMATION SYSTEMS UNDER CONDITIONS OF INEXACTNESS
V B ROBINSON and A H STRAHLER (Hunter College, New York, NY) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 198-204 refs

A discussion of locational approximation and attribute approximation as sources of inexactness in geographic information systems (GIS) is presented By introducing a logic of inexactness that can serve as the basis of representing and manipulating spatial data that is intrinsically fuzzy, an attempt at formulating a consistent model for handling inexactness in GIS is made Definitions and examples of four distinct cases where there is a nonfuzzy schema/nonfuzzy data, nonfuzzy schema/fuzzy data, fuzzy schema/nonfuzzy data, and fuzzy schema/fuzzy data are given, and three approaches to managing fuzzy data within a nonfuzzy schema are considered M D

A85-38823* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
REGION-BASED MODELING ALGORITHMS FOR REMOTELY-SENSED DATA
M GOLDBERG, M L IMHOFF (NASA, Goddard Space Flight Center, Greenbelt, MD), and E DADDIO (Science Applications Research, Riverdale, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 205-208

Five algorithms being developed for performing region-based modeling operations on classified remotely-sensed images are described The first algorithm converts images from standard grid structure into topological grid structure, while the remaining algorithms act upon topologically grid-structured images to perform region-based relabelling, overlaying, distance searching, and neighborhood scanning operations The use of precomputed topological information, through the use of topological grid structure, makes region-based algorithms highly accessible to earth scientists M D

A85-38825* Indiana State Univ , Terre Haute
EVALUATION OF ATMOSPHERIC PARTICULATE CONCENTRATIONS DERIVED FROM ANALYSIS OF RATIO THEMATIC MAPPER DATA
W H CARNAHAN, P. W MAUSEL, and G P ZHOU (Indiana State University, Terre Haute, IN) IN· Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 235-243 refs
(Contract NAS5-26859)

An approach for atmospheric particulate concentration evaluation above urban areas using ratio Thematic Mapper (TM) data is discussed October 25, 1982 TM data over Chicago, IL are analyzed using TM band ratios of 1/2, 1/3, 1/4, 1/5, and 1/6 and particulate concentration estimates derived from TM ratios are tested over low reflective turbid water sites and highly reflective concrete highways From analysis of the data it is evident that for water, the pattern of increasing particulate concentration is associated with decreasing ratio values in all band combinations used Over concrete features, the TM band 1/4 ratio values follow the predicted pattern, while the TM band 1/6 has ratios which are reversed from anticipated values M D.

A85-39537
AN OBJECTIVE TECHNIQUE FOR THE DELINEATION AND EXTRAPOLATION OF THUNDERSTORMS FROM GOES SATELLITE DATA
E CHERNA, A BELLON, G L AUSTIN, and A KILAMBI (McGill Radar Weather Observatory, Sainte-Anne-de-Bellevue, Quebec, Canada) (National Science Foundation, International Conference on Atmospheric Electricity, 7th, Albany, NY, June 4-8, 1984) Journal of Geophysical Research (ISSN 0148-0227), vol 90, June 30, 1985, p 6203-6210 Research supported by the Natural Sciences and Engineering Research Council of Canada, Atmospheric Environment Service of Canada, and U S Air Force refs

An empirical relationship between radar reflectivity levels exceeding 32 and 40 dBZ at a height of 6 km and sferics data is used to generate maps that indicate regions of thunderstorms These radar maps serve as ground truth when compared with colocated GOES visible and infrared imagery A threshold computed to equalize the radar and satellite thunderstorm areas delineates the region in visible-IR space that is most probably associated with electrical activity The locations of satellite-delineated storms beyond radar range, on the synoptic scale, show good agreement with sources of lightning determined from sferics detectors The skill of the extrapolation of these areas for short-range forecasting is discussed Author

N85-24392# National Environmental Satellite Service, Washington, D C
ENVIRONMENTAL SATELLITES
R KOFFLER *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 11 p 1982
Avail NTIS HC A10/MF A01

The history, status, and future of NASA environmental satellite programs are discussed The GOES, NOAA, and TIROS-N satellite contributions to meteorology and environmental monitoring are outlined Author (ESA)

N85-27321*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
STUDY OF THE URBAN EVOLUTION OF BRASILIA WITH THE USE OF LANDSAT DATA [ESTUDO DA EVOLUCAO URBANA DE BRASILIA ATRAVES DO USO DE DADOS LANDSAT]
M. D L. N DEOLIVEIRA, Principal Investigator, C FORESTI, M NIERO, and E M D M F PARREIRAS Oct 1984 32 p refs In PORTUGUESE, ENGLISH summary Presented at the 15th Congr Intern de Fotogrametria e Sensoriamento Remoto, Rio de Janeiro, Jun 1984 and at the 1st Congr Brasil de Defesa do Meio Ambiente, Rio de Janeiro, Jul 1984 Sponsored by NASA Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(E85-10101, NASA-CR-175830, NAS 1 26 175830, INPE-3322-RPE/468) Avail NTIS HC A03/MF A01 CSCL 05B

The urban growth of Brasilia within the last ten years is analyzed with special emphasis on the utilization of remote sensing orbital data and automatic image processing The urban spatial structure and the monitoring of its temporal changes were focused in a whole and dynamic way by the utilization of MSS-LANDSAT images for June 1973, 1978 and 1983 In order to aid data interpretation, a registration algorithm implemented at the Interactive Multispectral Image Analysis System (IMAGE-100) was utilized aiming at the overlap of multitemporal images The utilization of suitable digital filters, combined with the images overlap, allowed a rapid identification of areas of possible urban growth and oriented the field work The results obtained permitted an evaluation of the urban growth of Brasilia, taking as reference the proposed stated for the construction of the city Author

N85-27770# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
EXPERIENCE OF THE INSTITUTE OF SPACE RESEARCH WITH THE USE OF REMOTE SENSING IN URBAN PLANNING STUDIES [A EXPERIENCIA DO INPE NO USO DE SENSORIAMENTO REMOTO PARA ESTUDOS DE PLANEJAMENTO URBANO]
Jun 1984 18 p refs In PORTUGESE Presented at the 4th Congr Brasil de Geografos, Sao Paulo, Brazil, 14-23 Jul 1984 and at the 4th Ann Reunion of the Soc de Especialistas Latinoamericanos en Perception Remota, Santiago de Chile, 12-16 Nov 1984
(INPE-3159-PRE/533) Avail NTIS HC A02/MF A01

The experience of researchers at Brazil's Institute of Space Research with the development and application of methods related to the use of remote sensing data is described Since 1973 this experience has involved the use of photographic products at low altitudes as well as the acquisition of orbital data Studies are described which employ remote sensing data to monitor urban land use, urban growth, quality of life, and socioeconomic characteristics The application of remote sensing data for the purpose of implementing urban mathematical models is discussed Transl by B G

03

GEODESY AND CARTOGRAPHY

Includes mapping and topography

A85-33448
THE WORLD'S TOPOGRAPHIC AND CADASTRAL MAPPING OPERATION
A J BRANDENBERGER and S K GHOSH (UniversiteLaval, Quebec, Canada) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1122), vol 51, April 1985, p 437-444 Research sponsored by the United Nations and Natural Sciences and Engineering Research Council of Canada refs

The Cartographic Section of the United Nations conducts surveys on the status of the world topographic mapping at regular six-year intervals The first survey was conducted in 1968, while a recount survey was undertaken in 1974 A third survey, performed in 1980, included cadastral mapping for the first time The present paper has the objective to present and discuss the most important results of the 1980 survey As in previous UN surveys the available map coverage information was classified according to four scale ranges, including category 1 25,000 and larger, category 1 50,000, category 1 100,000, and category 1 250,000 Attention is given to an analysis of the status (progress) of world topographic mapping, topographic map revision, aerial photographic coverage, geodetic bases and ground control for base mapping, equipment used in the world's cartographic agencies, and aspects of world cadastral surveying and mapping G R

A85-37302
THE DEVELOPMENT AND CURRENT STATE OF EARTH EXPANSION AND FLUCTUATION PROBLEMS [RAZVITIE I SOVREMENNOE SOSTOIANIE PROBLEM RASSHIRENIIA I PUL'SATSII ZEMLI]
E E MILANOVSKII IN Earth expansion and fluctuation problems Moscow, Izdatel'stvo Nauka, 1984, p 8-24 In Russian refs

The development of theories concerning the expansion of the earth and fluctuations in earth dimensions is reviewed Data from the fields of geology, geophysics, and comparative planetology are presented in order to explain the major phenomena associated with planetary expansion including sea-floor spreading and variations in subduction rates The data are used to develop a history of earth expansion covering the period 3 5 billion years ago to the present Maps illustrating the structural changes in the lithosphere over the last 3 5 billion years are provided I H

A85-37310
RESULTS OF A STUDY OF NONTIDAL GRAVITY VARIATIONS [NEKOTORYE REZUL'TATY IZUCHENIIA NEPRILIVNYKH IZMENENII SILY TIAZHESTI]
IU D BULANZHE IN Earth expansion and fluctuation problems Moscow, Izdatel'stvo Nauka, 1984, p 73-84 In Russian refs

Measurements of nontidal gravity variations in Eastern Europe in the period 1935-1984 are reported It was found that the strength of the gravitational field in Siberia varied by as much as 50 mkGal in the period 1965-1977 At points in Moscow, Potsdam, and Novosibirsk, similar periodic variations were measured The amplitude of the above variations was about 20 mkGal, and the period was about 7 years The occurrence of variations was closely correlated with volcanic activity, and with tectonic phenomena which lead to upwelling of matter toward the earth surface A map of the gravity variations in Eastern Europe is provided I H

N85-23215*# MacQuarie Univ , North Ryde (Australia)
MAGSAT ANOMALY FIELD DATA OF THE CRUSTAL PROPERTIES OF AUSTRALIA
1983 88 p refs Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(E85-10100, NASA-CR-175615, NAS 1 26 175615) Avail NTIS HC A05/MF A01 CSCL 05B

Progress is reported in producing maps of Australia showing, crustal magnetic anomalies at constant elevation, bulk surface magnetization, and the geomagnetic field intensity, inclination and declination for the Australian region from global models of the geomagnetic field derived from MAGSAT data The development of a data base management system is also considered

N85-23216*# MacQuarie Univ , North Ryde (Australia) Centre for Geophysical Exploration Research
AN INVESTIGATION OF THE CRUSTAL PROPERTIES OF AUSTRALIA AND SURROUNDING REGIONS DERIVED FROM INTERPRETATION OF MAGSAT ANOMALY FIELD DATA Final Report
B D JOHNSON, C N G DAMPNEY, and B J J EMBLETON (CSIRO, North Ryde, Australia) *In its* MAGSAT Anomaly Field Data of the Crustal Propeties of Australia 40 p 1983 refs Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls , S D 57198 ERTS
Avail NTIS HC A05/MF A01 CSCL 08G

The 2 deg averaged data set was analyzed and filtered to produce a magnetic anomaly map of the Australian continental region The map was overlain on a tectonic map of Australia and correlations were made A data set was selected that is dominated by relatively low elevation profiles with small changes of elevation within the Australian area in an effort to maximize the crustal anomaly field signal and reduce the effect of variation in satellite elevation Support systems, both hardware and software are described and best-worst case errors encountered during processing of MAGSAT investigator tapes are summarized The Broken Ridge anomaly was studied for model development purposes A R H

N85-23219*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
REMANENT MAGNETIZATION MODEL FOR THE BROKEN RIDGE SATELLITE MAGNETIC ANOMALY
B D JOHNSON (Macquarie Univ , North Ryde, Australia) *In* Macquarie Univ MAGSAT Anomaly Field Data of the Crustal Properties of Australia 22 p 1983 refs ERTS
Avail NTIS HC A05/MF A01 CSCL 08G

A crustal model for the interpretation of the Broken Ridge satellite magnetic anomaly was constructed from bathymetric data assuming an Airy-type isostatic compensation An average crustal magnetization of 6 A m is required to account for the observed anomaly amplitudes provided that the whole crust is homogeneously magnetized In contrast, a model representing only the topographic expression of the Broken Ridge, above the surrounding sea floor, requires a magnetization of the order of 40 A m-1 Since this latter figure is much higher than is to be expected from studies of magnetic properties of oceanic rocks, it is concluded that the majority of the crustal volume of Broken Ridge is magnetized relatively uniformly The direction of the source magnetization is consistent with an inclination shallower than the present geomagnetic field and close to that of an axial dipole Since a more northerly source location for Broken Ridge is contrary to the paleolatitude data it is though that the magnetization represents a magnetization obtained by averaging the geomagnetic field direction over a sufficient time to remove secular variation effects This pattern is indicative of viscous magnetization A R H

N85-25355# Joint Publications Research Service, Arlington, Va.
PRELIMINARY PROCESSING OF LASER RANGING DATA FROM LAGEOS ARTIFICIAL EARTH SATELLITE DURING SHORT MERIT PROGRAM OBSERVATION PERIOD Abstract Only
V V NESTEROV *In its* USSR Rept Space (JPRS-USP-85-003) p 119 4 Mar 1985 Transl into ENGLISH from Pisma v Astronomicheskiy Zh (USSR), v 10, no 5, May 1984 p 397-400
Avail NTIS HC A08/MF A01

The results of LAGEOS ranging during the period August-September 1980 consists of pairs of numbers topocentric distances and observation times. The problems involved in the processing of these data are complex The possible approaches which could be employed in preliminary processing are discussed and the procedures adopted are outlined All data were recorded into a form adopted for computer processing, standardization and resorting The normal points method was selected to improve accuracy, supplemented by the smoothing method It is decided to use a smoothing interval of about 150 sec and a smoothing coefficient of 10/5 The distances are deemed suitable for checking various space geodesy algorithms E A K

N85-26050# Lamont-Doherty Geological Inst, Palisades, N Y
ON GEOID HEIGHTS AND FLEXURE OF THE LITHOSPHERE AT SEAMOUNTS
A B WATTS and N M RIBE 10 Dec 1984 21 p Repr from Jnl of Geophysical Research, v 89, no B13, 10 Dec 1984 p 11152-11170
(Contract N00014-80-C-0098)
(AD-A151220, LDGO-3708) Avail NTIS HC A02/MF A01
CSCL 08E

The sea suface height has now been mapped to an accuracy of better than + or - 1 m by using radar altimeters on board orbiting satellites The major influence on the mean sea surface height is the marine geoid which is an equipotential surface We have carried out preliminary studies of how oceanic volcanoes, which rise above the ocean floor as isolated seamounts and oceanic islands or linear ridges, contribute to the marine geoid Simple one and two dimensional models have been constructed in which it is assumed that the oceanic lithosphere responds to volcanic loads as a thin elastic plate overlying a weak fluid substratum Previous studies based on gravity and bathymetry data and uplift/subsidence patterns show that the effective flexural rigidly of oceanic lithosphere and the equivalent elastic thickness T sub e increase with the age of the lithosphere at the time of loading This models predict that isolated seamounts emplaced on relatively young lithosphere on or near a mid-ocean ridge crest will be associated with relatively low amplitude geoid anomalities (about 0 4-0 5 m/km of height), while seamounts formed on relatively low over the Mid- Pacific Mountains and Line Islands, which formed on or near a mid-ocean ridge crest, and relatively high over the Magellan Seamounts and Wake Guyots, which formed off ridge GRA

N85-26829# Joint Publications Research Service, Arlington, Va
MINIMIZING INFLUENCE OF EARTH'S CURVATURE IN PROJECTIVE RECTIFICATION OF SPACE PHOTOGRAPHS INTO PHOTOPLANS AND PHOTOMAPS Abstract Only
A M KUZINA, N S RAMM, and A P SKORODUMOV *In its* USSR Rept Space (JPRS-USP-85-004) p 87 6 May 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (Moscow), no 6, Nov--Dec 1984 p 101-106 Original language document was announced in IAA as A85-25662
Avail NTIS HC A06

The geometrical correction of space photographs required for their rectification into photoplans and photomaps in a particular projection is usually accomplished without allowance for local relief and involves elimination of the influence of tilt and the Earth's curvature In this article it is shown that this correction can be considerably simplified by replacing the coupling of space photograph coordinates and the photoplan (photomap) by a projective (linear-fractional) dependence Such a replacement makes it possible to rectify space photographs on standard photorectifiers It also makes possible a sharp increase in the efficiency of digital rectification of space photographs It has been stated that in virtually all cases these procedures would result in a considerable decrease in the accuracy of the compiled maps of plans. It is demonstrated that with an effective choice of the projective correspondence the residual errors are decreased by several times and accordingly there is a broadening of the field of application of projective rectifications of space photographs B W.

N85-27374# Federal Geodetic Control Committee, Washington, D C
STANDARDS AND SPECIFICATIONS FOR GEODETIC CONTROL NETWORKS
Sep 1984 37 p refs
(PB85-166478, LC-84-600257) Avail NTIS HC A03/MF A01
CSCL 08E

This single publication is designed to replace both Classification, Standards of Accuracy and General Specifications of Geodetic Control Surveys, issued February 1974, and Specifications to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys, issued June 1980 Topics covered include the following (1) Standards--(horizontal control network standards, vertical control network standards, gravity control network standards), (2) Specifications--(triangulation, traverse, inertial surveying, geodetic leveling, photogrammetry, satellite Doppler positioning, absolute gravimetry, relative gravimetry), (3) Governmental authority, and (4) variance factor estimation Procedures for submitting data to the National Geodetic Survey are discussed GRA

N85-29338# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
INFORMATION RELATIVE TO CARTOGRAPHY AND GEODESY. SERIES 2: TRANSLATIONS, NUMBER 42, VOLUME 1
1984 49 p refs
(ISSN-0469-4244) Avail NTIS HC A03/MF A01

The NOAA 7 satellite imagery mapping of Central Europe and Antarctica, the significance of orthophoto maps for developing nations, and German contributions to Antarctic cartography by photogrammetry and remote sensing are discussed

N85-29339# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
TWO SATELLITE IMAGE MAPS OF CENTRAL EUROPE
U BUECHER, W GOEPFERT, W WEBER, and I WILSKI *In its* Inform Relative to Cartography and Geodesy Ser 2 Transl, No 42, Vol 1 p 5-10 1984 refs
Avail NTIS HC A03/MF A01

Two satellite image maps of Central Europe at 1 3 million scale were produced using computer techniques The technology, data sources, and hardware systems used for their production are described Author (ESA)

N85-29341# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
THE SIGNIFICANCE OF ORTHOPHOTO MAPS FOR DEVELOPING COUNTRIES
J NITTINGER *In its* Inform Relative to Cartography and Geodesy Ser 2 Transl, No 42, Vol 1 p 17-28 1984 refs
Avail NTIS HC A03/MF A01

Orthophoto maps as planning tools are discussed They can also be used as a basis for cadastral maps and for the recording of land register data This is demonstrated by examples from Thailand, Central America, and Haiti Author (ESA)

N85-29342# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
GERMAN CONTRIBUTIONS TO THE CARTOGRAPHY OF ANTARCTICA BY MEANS OF PHOTOGRAMMETRY AND REMOTE SENSING
H SCHMIDT-FALKENBERG *In its* Inform Relative to Cartography and Geodesy Ser 2 Transl , No 42, Vol 1 p 29-48 1984 refs
Avail NTIS HC A03/MF A01

Exploration of the Antarctic and cartographic activities by Germany before 1945 are reviewed, including the Antarctic Expedition of 1938/39 and the first use of aerial survey cameras by a German team Activities after 1945, in the topographic-chorographic cartography of the Antarctic and the establishment and revision of a Digital Name File Antarctica in German are described Activities planned by the Federal Republic of Germany in the Antarctic in photogrammetry and remote sensing are outlined Author (ESA)

N85-29343# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
REPORTS ON CARTOGRAPHY AND GEODESY. SERIES 1: ORIGINAL REPORTS, NUMBER 93 [NACHRICHTEN AUS DEM KARTEN- UND VERMESSUNGSWESEN. REIHE 1: ORIGINALBEITRAEGE, HEFT NR 93]
1984 111 p refs In GERMAN, ENGLISH summary Original contains color illustrations
(ISSN-0469-4236) Avail NTIS HC A06/MF A01

An operational procedure for the universal, dynamic, geometric rectification of perturbed airborne scanner digital image recordings is presented An information-theoretical method for automatic noise elimination in digital image processing is discussed

N85-29449*# Sigma Data Services Corp , Greenbelt, Md
DERIVATION OF MODEL TOPOGRAPHY Abstract Only
R C BALGOVIND *In* NASA Goddard Space Flight Center Res Rev , 1983 p 48-49 Jan 1985
Avail NTIS HC A08/MF A01 CSCL 04B

The Fourth-Order model necessitates representation of the topography The problem of the representation of the topography at grid points is addressed The attempted was to derive an envelope topography The TI is obtained by taking local mean plus one standard deviation at each grid point and sigma filtering it The method was greatly influenced by large standard deviations at steep mountains The O1 topography is the local mean The S1 is obtained by Sigma filtering in both latitude and longitude the mean O1 The S2 is when the operation is applied twice and S3 thrice, the Q3 is the sigma filtered local mean of the upper third quantile of the source data E A K

04

GEOLOGY AND MINERAL RESOURCES

Includes mineral deposits, petroleum deposits, spectral properties of rocks, geological exploration, and lithology

A85-30733
APPLICATION OF DIGITALLY PROCESSED AND ENHANCED LANDSAT IMAGERY FOR GEOLOGICAL MAPPING AND MINERAL TARGETING IN THE SINGHBHUM PRECAMBRIAN MINERALIZED BELT, BIHAR-ORISSA
A M RAKSHIT (Geological Survey of India, Calcutta, India) and V L SWAMINATHAN (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 457-471 refs

A85-30734
TARGETING AREAS FOR MINERAL EXPLORATION - A CASE STUDY FROM ORISSA, INDIA
S K BHAN and V S HEGDE (National Remote Sensing Agency, Hyderabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 473-479 Research sponsored by the Directorate of Mines of Orissa

Landsat data comprising eight scenes in the northern and central part of Orissa State, in eastern India were interpreted visually for delineation of target areas for mineral exploration Even though this area has been mapped and studied in considerable detail Landsat data have been found to be very useful in redefining the tectonic structure, correlation of regional features, and mapping of hitherto unmapped features Subsequently one scene (path 152 row 047) was digitally analyzed, and enhanced for delineation of bauxitic lateritic plateaux and for comparison with visual interpretation Author

A85-30735
PROJECT INDRAVATI. I - AN APPRAISAL OF THE NATURAL RESOURCES OF THE INDRAVATI BASIN, ORISSA, MADHYA PRADESH AND MAHARASHTRA, INDIA
N K DUTTA, S M DUTTA, V K MATHUR, D N SETTI (Geological Survey of India, Raipur, India), S C SARKAR (National Atlas and Thematic Mapping Organization, Calcutta, India), C J THAMPI (National Bureau of Soil Survey and Land-Use Planning, Nagpur, India), and V B JOSHI (Forest Survey of India, Dehradun, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 481-496

An integrated natural resources survey over the Indravati basin, which covers an area of 40,000 sq km in central India is carried out in order to demonstrate the capabilities of remote-sensing techniques for the appraisal, evaluation, and effective utilization of natural resource potentials, and the structural linkages necessary to evolve a national natural resources management system Several agencies of the Indian government and their roles in the project are discussed Data on geology, geomorphology, structure, lineaments, drainage, soil, and vegetation are collected and codified, based on visual interpretation of Landsat imagery It is shown that the area exhibits a complex physiographic and geological history and varied soil types Two areas are delineated for detailed work by large-scale aerial photography and multispectral scanner surveys coupled with ground exploration M D

A85-30736
CORRELATION OF LANDSAT DATA WITH SURFACE AND SUBSURFACE INFORMATION - A SYNERGISTIC, QUANTITATIVE APPROACH TO OIL EXPLORATION IN GUJARAT, INDIA
D S MITRA, K VARADARAJAN (Oil and Natural Gas Commission, Malaviya Institute of Petroleum Exploration, Dehradun, India), T J MAJUMDAR, and D S KAMAT (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 497-506

A85-30741
MONITORING CHANGES IN ECOLOGY IN THE KUDREMUKH MINING REGION
D S KAMAT, A K S GOPALAN, K L MAJUMDER, R RAMAKRISHNAN (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), V R RAO (Indian Space Research Organization, Bangalore, India), S R NAGA BHUSANA, S THAYALAN (National Bureau of Soil Survey and Land-Use Planning, Bangalore, India), H P KRISHNAPPA, and A S SADASHIVAIAH (Karnataka Forest Department, Bangalore, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 541-548 refs

Iron-ore deposits of the Kudremukh region in Karnataka State, India, were discovered at the beginning of the present century These deposits have only recently begun to be exploited As a result the land cover, particularly the grassland areas, are becoming

disturbed This paper is the outcome of a joint study undertaken by three central and state government agencies in India for monitoring the ecological changes in the above region Multitemporal Landsat MSS data together with aerial CIR photographs and ground data were used for the study The study mainly addressed the mapping of land-cover changes, which is one of the most important indicators of ecological monitoring
Author

A85-30742
ASSESSMENT OF THE ROLE OF REMOTE SENSING TECHNIQUES IN MONITORING SHORELINE CHANGES - A CASE STUDY OF THE KERALA COAST
P P RAO, M M NAIR, and D V RAJU (Geological Survey of India, Hyderabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 549-558 refs

The Kerala coastal region of Southwest India was the object of analysis using Landsat MSS data and aerial photographs due to its susceptibility to erosion, having lost 600 m of land to the sea in the past century The surveys were performed to characterize the geological, structural and geomorphological features of the region, establish a data base for multitemporal monitoring of shoreline changes and their causes, and investigate the interrelationships among the operative erosive processes The Landsat data is of sufficient quality to discern areas of crystalline rocks, soft sediments, granite and basic dikes, as well as lineament, fracture and fault patterns The data have thus far pinpointed soft sediment areas as those most subject to erosion, which is modified by neotectonic movements Mud banks were found to be responsible for both erosion and accretion Long-term monitoring will be effected with airborne MSS scans, since the Landsat MSS does not have sufficiently high resolution M S K

A85-31736
IMAGE PROCESSING APPLICATIONS FOR GEOLOGIC MAPPING
M ABRAMS, A BLUSSON, V CARRERE, T NGUYEN, and Y RABU (IBM France, S A , Paris, France) IBM Journal of Research and Development (ISSN 0018-8646), vol 29, March 1985, p 177-187 Research supported by the IBM France, S A , Centre National d'Etudes Spatiales, and Centre National de la Recherche Scientifique refs

The present investigation is concerned with approaches for the creation of better images for geologic mapping A description is presented of the use of supervised classification methods for lithologic discrimination In addition to the use of spectral information, a texture parameter was calculated to incorporate spatial information into the analyses A supervised classification algorithm, the Bayesian maximum likelihood classifier, was used to produce thematic maps based on training areas The different maps were combined to produce the final map The application of automatic lineament detection and the generation of rose diagrams are also discussed, and a study is presented of the geologic utility of coregistered Landsat and Heat Capacity Mapping Mission (HCMM) data G R

A85-32144
COBALT-ABITIBI PROJECT - LANDSAT IMAGE ANALYSIS IN THE CANADIAN SHIELD APPLICATION OF THE GEOLOGICAL ANALYSIS AID PACKAGE
J HARRIS, F G BERCHA, and B BRUCE (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p. 697-706 refs

A85-32145
FRACTURE MAPPING OF PART OF NORTHERN ONTARIO USING LANDSAT IMAGERY
A BOUD and J WOOD (Ministry of Natural Resources, Ontario Geological Survey, Toronto, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 707-715 refs

An attempt was made to map fractures and fracture patterns in the Protozoic Huronian rocks of the Canadian Shield in northern Ontario as an aid to mineral surveying through mapping of tectonic features Specifically, the study was targeted at detecting extensions of known faults, indentifying regional fracture patterns, establishing relationships between dikes and faults, quantifying the ages of the faults and outlining the structural blocks caused by rifting Landsat images at a 1 250,000 scale were used in combination with aerial photographs on a 1 15,840 scale Satellite imagaes during winter had 20 percent less cloud cover obscuration The patterns observed were similar to those recorded on Mars, the moon and Mercury The Landsat imagery was useful for identifying regions worthy of further geological investigations and neglecting surveys of rejected areas M S K

A85-32147
BASIC OUTLINE OF A GUIDE FOR THE USE OF LANDSAT IMAGES IN GEOLOGY [BASES D'UN GUIDE D'UTILISATION DES IMAGES LANDSAT EN GEOLOGIE]
M G TANGUAY (Montreal, Universite, Montreal, Canada) and C SEUTHE IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 733-745 In French Sponsorship Department of Energy, Mines and Resources refs
(Contract DEMR-101-4-80)

The results of a study to identify Landsat image characteristics which reveal subsurface geological features, i e , lineaments, are reported Two regions in Quebec and Ontario, Canada, were chosen as the study areas Lineaments are known to appear as curved or intersecting straight lines, as lines darker than surrounding regions, and as textural or shape discontinuities in Ladsat images MSS images were scanned for lineaments, which were then compared with known lineaments from aerial magnetic and geological maps of the area It was found that images taken in autumn, winter and summer, the latter as confirmational data, best revealed lineaments when combined It was necessary to segment the images into tectonic sectors of independent structural tendencies, divide the lineaments into major and secondary features, and then combine similar lineaments within each sector The mineralogical implications of the lineaments mapped in the study areas are discussed M S K

A85-32148
MAPPING SURFICIAL GEOLOGY BY LANDSAT - AN INVESTIGATION INTO VARIATIONS IN SPECTRAL RESPONSE PATTERNS
J K HORNSBY (Intera Environmental Consultants, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 779-784 refs

The characteristics and degree of spectral variations from one Landsat image to another were investigated in terms of their yield of geologic and geomorphologic information Sample images were generated for an area near Baker Lake in the Northwest Territories The 512 x 512 pixel images were separated by two days and by 33 days for one subscene Geological classifications were made on a 1 125,000 scale using all four MSS bands The accuracies of the images were determined on the bases of a number of sample points previously characterized by aerial and ground surveys. Spectral variations were more significant temporally than

were spatially-induced variations, as determined by analysis of variance computations The imagery was concluded suitable for mapping surficial geology over large regions by extending data from one region to another numerically, then performing a small amount of ground checking M S K

A85-33875
GEOLOGICAL INTERPRETATION OF LANDSAT IMAGERY OF THE BANGLADESH GANGES DELTA
A SESOREN (Rijks Geologische Dienst, Haarlem, Netherlands) ITC Journal (ISSN 0303-2434), no 3, 1984, p 229-232

A85-35101
REMOTE SENSING FOR GEOLOGICAL MAPPING; PROCEEDINGS OF THE SEMINAR, ORLEANS, FRANCE, FEBRUARY 2-4, 1984
P TELEKI, ED (U S Geological Survey, Reston, VA) and C WEBER, ED (Bureau de Recherches Geologiques et Minieres, Orleans, France) Seminar sponsored by the International Union of Geological Sciences and UNESCO Orleans, France, Bureau de Recherches Geologiques et Minieres (IUGS Publication, No 18), 1984, 303 p For individual items see A85-35102 to A85-35120

Among the topics discussed are pattern recognition for geological remote sensing, the application of space images to neotectonic studies, an integral and orientational technique for geological mapping and ore exploration, the use of Landsat data for mineral exploration in Canada, a comparison of remote sensing systems employed for geological mapping in Brazil, geological cartography using SLR imagery, and the geological interpretation of Seasat SAR imagery Also covered are medium-to-small-scale geological maps based on Landsat MSS data, recent developments in lithological mapping based on remote sensing data, the lithological mapping of heavily weathered terrain by means of IR remote sensing, satellite, ground, and laboratory spectral signature research on ore bodies, and the remote detection of geobotanical anomalies associated with hydrocarbon microseepage O C

A85-35102#
REMOTE SENSING IN GEOLOGY - A DECADE OF PROGRESS
W D CARTER (Globex, Inc , Reston, VA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 15-27 Research supported by the U S Geological Survey, International Union of Geological Sciences, and COSPAR refs

A development history is presented for Landsat and Space Shuttle multispectral imaging systems The first Landsat-borne instrument began orbital operations in 1972, yielding black-and-white image transparencies and paper prints until color-IR images became available and facilitated the study of relationships among vegetation, hydrological, and cultural features The art of merging Landsat images with other hydrological, geophysical and geochemical data has further enhanced exploration techniques, especially with reference to vegetation anomalies that imply geochemical concentrations above ore deposits Oil, gas, gold, tin, copper, lithium, and other mineral resources have been thus uncovered Experimental results from the Space Shuttle Multispectral IR Radiometer and Imaging Radar are noted O C

A85-35103#
IMPORTANCE OF PATTERN RECOGNITION FOR GEOLOGICAL REMOTE SENSING APPLICATIONS AND NEW LOOK AT GEOLOGICAL MAPS
J CHOROWICZ (Paris VI, Universite, Paris, France) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 29-40

The most important method for the derivation of geological maps from remote sensing data is the recognition of four-dimensional geological and geomorphological objects, using stereoscopic observations that are increasingly aided by computerized image processing Through the use of geomorphological and geological pattern recognition as a priority, together with age dating that has been completed by image processing, it becomes possible to create and store regular geological maps, draw simplified small scale maps on the basis of large ones, and create a novel type of small scale geological map on which geomorphological features are represented by specific symbols which expressly indicate missing data and yield a superior representation of sub-surface features O C

A85-35104#
APPLICATIONS OF SPACE IMAGES FOR NEOTECTONIC STUDIES
V G TRIFONOV (Akademiia Nauk SSSR, Geologicheskii Institut, Moscow, USSR) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 41-56 refs

Attention is given to three aspects of the application of aircraft and spacecraft imagery for the southern regions of the Soviet Union (1) the detection, study, and mapping of such neotectonic zones as the Holocene activity zones, (2) the study of the deep seated structures of active areas generally, and (3) seismic risk studies The lineaments observable in spacecraft images correspond to patterns of geophysical anomalies and semismicity distribution, thereby reflecting elements of recent, deep seated structure in the active zones These elements differ in some instances from the active upper crustal elements, and exhibit recent tectonic layering and lithospheric disharmony The determination of seismically dangerous areas can be made on the basis of these neotectonic studies Author

A85-35105#
CORRELATIONS BETWEEN SPATIAL REMOTE SENSING, GEOCHEMICAL AND GEOPHYSICAL DATA IN WESTERN FRANCE - AN INTEGRATIVE AND ORIENTATION TECHNIQUE FOR GEOLOGICAL MAPPING AND ORE EXPLORATION
J -Y SCANVIC, PH DUTARTRE, and CH KING (Bureau de Recherches Geologiques et Minieres, Orleans, France) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 57-77 refs

A85-35106#
LANDSAT DATA FOR OPERATIONAL MINERAL EXPLORATION - THE CANADIAN EXPERIENCE
B BRUCE (Canada Centre for Remote Sensing, Ottawa, Canada) and V SINGHROY (Ontario Centre for Remote Sensing, Toronto, Canada) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 79-90 refs

An evaluation is made of Canadian experience with the application of Landsat imagery to mineral resources exploration, by means of the Geologic Analysis Aid Package (GAAP) GAAP consists of three entry-level image products designed to facilitate visual geologic interpretation of Landsat imagery, using the basic elements of 'Color Image Optimized for Visual Geologic Interpretation', a 'Textural Analysis Aid', and a 'Pattern and Linear Analysis Aid' Emphasis is given to the recognition of vegetation as an important source of geologic data, and fast production and supply of simple output products O C

A85-35107#
REMOTE SENSING SYSTEMS COMPARISONS FOR GEOLOGICAL MAPPING IN BRAZIL
G AMARAL (Sao Paulo, Universidade, Sao Paulo, Brazil) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 91-106

The territory of Brazil has been completely covered by Landdat MSS, Return Beam Vidicon (RBV) and Side-Looking Airborne Radar

(SLAR) imagery Comparative studies of the performance of different sensor products in geomorphological and mineralogical studies have indicated that Landsat MSS images are superior to those of SLAR for geological mapping SLAR images have furnished data similar to that of MSS band 7, but with lower tonal variations, for the case of the heavily vegetated areas of the Amazon and Atlantic forests For the drier and permanently clouded northeastern region, however, SLAR has provided most of the more useful data In some regions, Space Shuttle Imaging Radar-A images resemble those of MSS band 7 O C

A85-35108#
GEOLOGICAL CARTOGRAPHY OF GABON USING SIDE-LOOKING RADAR IMAGERY - AN EXAMPLE OF AN INTEGRATED MAPPING PROJECT
J -M MONGET (Paris, Ecole Nationale Superieure des Mines, Valbonne, Alpes-Maritimes, France), DIOULY-OSSO (Ministere des Mines et des Hydrocarbures, Libreville, Gabon), J -P BASSOT (Clermont-Ferrand, Universite, Clermont-Ferrand, France), R -R HERNER (Mars Associates, Inc., Phoenix, AZ), and Y PATOUREAUX (Societe d'Etudes Techniques et d'Entreprises Generales, Division Espace, Valbonne, Alpes-Maritimes, France) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 107-128 refs

The cloud-free synoptic view of Gabon which has been obtained by means of the X-band SAR mapping yields a true geological perspective for the entire country which will be of particular consequence for natural resource exploration Radar photogeologists have interpreted the radar imagery with a view of the refinement of the structural and lithological data content of existing maps, and compared the resuls thus obtained with field observations O C

A85-35109*# Societe Europeenne de Propulsion, Puteaux (France)
GEOLOGIC INTERPRETATION OF SEASAT SAR IMAGERY NEAR THE RIO LACANTUM, MEXICO
PH REBILLARD (Societe Europeenne de Propulsion, Puteaux, Hauts-de-Seine, France, California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and T DIXON (California Institute of Technology, Jet Propulsion Laboratory, Pasadena,CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 129-141 NASA-supported research refs

A mosaic of the Seasat Synthetic Aperture Radar (SAR) optically processed images over Central America is presented A SAR image of the Rio Lacantum area (southeastern Mexico) has been digitally processed and its interpretation is presented The region is characterized by low relief and a dense vegetation canopy Surface is believed to be indicative of subsurface structural features The Seasat-SAR system had a steep imaging geometry (incidence angle 23 + or - 3 deg off-nadir) which is favorable for detection of subtle topographic variations Subtle textural features in the image corresponding to surface topography were enhanced by image processing techniques A structural and lithologic interpretation of the processed images is presented Lineaments oriented NE-SW dominate and intersect broad folds trending NW-SE Distinctive karst topography characterizes one high relief area Author

A85-35110#
MEDIUM TO SMALL SCALE GEOLOGICAL MAPS BASED ON LANDSAT MSS AND RBV DATA - CASE HISTORIES OF PROJECTS IN NORTH AFRICA
F K LIST, B MEISSNER (Berlin, Freie Universitaet, Berlin, West Germany), G POEHLMANN, and U RIPKE (Berlin, Technische Fachhochschule, Berlin, West Germany) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1985 Bureau de Recherches Geologiques et Minieres, 1984, p 143-159 Research supported by the Deutsche Forschungsgemeinschaft and Continental Oil Co refs

A85-35111#
APPLICATIONS OF LANDSAT IMAGES TO GEOLOGICAL MAPPING IN TROPICAL JUNGLE ENVIRONMENT - CARONI RIVER BASIN, VENEZUELA
H O BRICENO (Universidad Central de Venezuela, Caracas, Venezuela) and K LEE (Colorado School of Mines, Golden, CO) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologique et Minieres, 1984, p 161-175 refs

Thick and continuous vegetation cover, usually considered a constraint for geologic mapping with remote sensors, has been used as the main source of spectral data for interpretation of Landsat images from the mid-section of the Caroni River basin, Venezuela The basic assumption made was that spectral properties of vegetation were a direct function of the nature of the underlying bedrock This approach, when combined with geomorphic criteria, proved to be a valid one for regional geologic cartography Three geologic domains defined in the interpretation stage correspond satisfactorily with the three major rock provinces in the area Furthermore, six areas were selected as potential targets for diamond placer exploration, five of them were verified in the field as alluvium, and four of the five diamond placers Author

A85-35112*# IBM France S A , Paris
RECENT DEVELOPMENTS IN LITHOLOGIC MAPPING USING REMOTE SENSING DATA
M ABRAMS (IBM France SA, Paris, France) and A KAHLE (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 177-189 NASA-supported research refs

Major development trends noted in remote sensing scanners are toward greater spatial and spectral resolution, as well as the acquisition of data over a broader portion of the electromagnetic spectrum Attention is presently given to representative samples of the product of two new-generation satellite sensors, the Landsat-4 Thematic Mapper and SPOT, as well as the status of airborne scanner research aimed at the exploration of multispectral data in the thermal IR wavelength region (which encompasses the diagnostic spectral features of silicates and carbonates) Testing is underway for scanners having spectral bands as narrow as 0 01 micron in the visible and near-IR, which will be capable of identifying specific minerals O C

A85-35114*# Jet Propulsion Lab , California Inst of Tech , Pasadena
RECENT ADVANCES IN GEOLOGIC MAPPING BY RADAR
T G FARR (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Bureau de Recherches Geologiques et Minieres, 1984, p 199-215 NASA-supported research refs

Quantitative techniques are available which allow the analysis of SAR images for the derivation of geological surface and process data In conjunction with calibrated radar sensors operating at several incidence angles, wavelengths, and polarizations, the compilation of multiparameter radar signatures of lithological and geomorphic units can accordingly proceed for geological mapping in unknown areas While radar image tone can be used in arid zones to derive surface micromorphology, heavily vegetated tropical regions require the analysis of radar image texture by means of Fourier techniques which decompose the image into bandpasses that represent different scales of texture O C

A85-35115#
LITHOLOGIC MAPPING IN DEEPLY WEATHERED TERRAIN USING VISIBLE-NIR, SWIR AND MID-INFRARED REMOTE SENSING TECHNIQUES
A-R GABELL, A-A GREEN, and J-F HUNTINGTON (Commonwealth Scientific and Industrial Research Organization, Div of Mineral Physics, North Ryde, New South Wales, Australia) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 217-232

Australian land surfaces have undergone deep lateritic weathering that produces mineral assemblages near the surface very different from those at depth Toward the base of the saprolitic zone of various clays and other secondary minerals, where fresh rock is being broken down, many of the secondary minerals can be related to the primary mineralogy of the fresh rock In order to deduce geology at depth, it is necessary to map and interpret the distribution of these secondary minerals, nearly all of which can fortunately be detected by means of visible, short wave IR, and mid-IR remote sensing Attention is presently given to the results of both laboratory and airborne spectrometer measurements from different zones of the weathering profile, as developed on a variety of lithologies O C

A85-35116#
CO2 LASER REFLECTANCE OF ROCKS FOR GEOLOGICAL REMOTE SENSING
J-E EBERHARDT, A-A GREEN, J-G HAUB, A-W PRYOR (Commonwealth Scientific and Industrial Research Organization, Div of Mineral Physics, North Ryde, New South Wales, Australia), and R-J-P LYON (Stanford University, Stanford, CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 233-250 refs

The range of mid-IR (8-14 microns) wavelengths available from a C-12 isotope C-13 CO2 mixed laser system is sufficient to define the reflectance properties of nearly all the silicate and carbonate materials to be found on terrain surfaces The problems inherent in passive systems are avoided by active sensing, and excellent spatial and spectral resolutions are obtainable Unfortunately, a considerable increase in sensing system complexity is also incurred Attention is presently given to the results of laboratory rock reflectance measurements O C

A85-35117#
CONTRIBUTION TO 'SPECTRAL SIGNATURE' RESEARCH ON ORE BODIES FOUND IN SOUTH MOROCCO, AT THREE LEVELS OF INVESTIGATION SATELLITE, GROUND AND LABORATORY
P BOUCHET, B CERVELLE, and J CHOROWICZ (Paris VI, Universite, Paris, France) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 251-265 refs

A85-35118#
GEOBOTANY IN GEOLOGICAL MAPPING AND MINERAL EXPLORATION
M-M COLE (Bedford College, London, England) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 267-286 refs

The scope and applications of geobotany are outlined, and its role in the interpretation of remotely sensed imagery for geological mapping and mineral exploration is assessed It is shown that the close relationship between vegetation, soils, and geology make geobotany an effective method of discriminating near-surface geological units, weathering products, and types and depth of overburden, particularly in remote areas of undisturbed natural terrains Higher-resolution multispectral imagery from satellite and airborne systems increases the potential applications of geobotany in geological mapping and mineral explorations The discussion is illustrated by results of specific studies V L

A85-35119#
THE SIGNIFICANCE OF SCALE IN GEOBOTANICAL APPLICATIONS FOR LITHOLOGIC DISCRIMINATION AND MINERAL EXPLORATION
N-M MILTON (U S Geological Survey, Reston, VA) and D-A MOUAT (Stanford University, Palo Alto, CA) IN Remote sensing for geological mapping, Proceedings of the Seminar, Orleans, France, February 2-4, 1984 Orleans, France, Bureau de Recherches Geologiques et Minieres, 1984, p 287-298 refs

Remotely sensed data are now available from a wide variety of instruments, each data set having a particular spectral and spatial resolution The changes in vegetation associated with changes in lithology or the presence of mineral deposits can also occur at different scales The task of geobotanical remote sensing is to choose or adapt the remotely sensed data to the appropriate geobotanical technique to solve the geological problem of interest Examples are given of a number of applications of data sets of different spectral and spatial resolution The relative importance of spectral and spatial resolution is discussed Author

A85-37118
GEOLOGICAL INFORMATION CONTENT OF SPACE IMAGES OBTAINED IN DIFFERENT SPECTRAL BANDS DURING THE GOBI-KHANGAI EXPERIMENT (MUSHUGAI TEST RANGE - GURVAN-BOGD) [GEOLOGICHESKAIA INFORMATIVNOST' KOSMICHESKIKH FOTOSNIMKOV, POLUCHENNYKH V RAZNYKH SPEKTRAL'NYKH DIAPAZONAKH V KHODE EKSPERIMENTE 'GOBI-KHANGAI' /POLIGON MUSHUGAI - GURVAN-BOGD/]
V I MAKAROV and G I VOLCHKOVA (Akademiia Nauk SSSR, Geologicheskii Institut, Moscow, USSR) Issledovanie Zemli iz Kosmosa (ISSN 0205-9614), Mar-Apr 1985, p 52-58 In Russian refs

A85-37150
VERTICAL COMPONENT MAGSAT ANOMALIES AND INDIAN TECTONIC BOUNDARIES
J G NEGI, P K AGRAWAL, and N K THAKUR (National Geophysical Research Institute, Hyderabad, India) Indian Academy of Sciences, Proceedings (Earth and Planetary Sciences) (ISSN 0370-0089), vol 94, March 1985, p 35-41 refs

Magsat vertical component (Z-component) of crustal anomalies are correlated for the first time with major geological and tectonic boundaries/features of the Indian subcontinent A prominent 'low' is consistently observed on all the profiles centered between 19 and 23 deg latitudes over the broad Peninsular 'high' The other conspicuous 'low' indicated from the present work is confined to the region above Sarda depression (29 deg N to 31 deg N) in the foothills of the Himalayas Interesting magnetic signatures are identified over the Narmada-Son rift and Godavan graben Author

A85-38808
MAPPING OF WOLFRAMITE REGION IN THE SIROHI DISTRICT (RAJASTHAN) IN INDIA FROM DIFFERENT DIGITALLY ENHANCED DATA PRODUCTS OF LANDSAT
A K GUPTA and V R RAO (Indian Space Research Organization, Bangalore, India) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 56-61 refs

A85-38810* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
THE UTILITY OF THEMATIC MAPPER SENSOR CHARACTERISTICS FOR SURFACE MINE MONITORING
J R IRONS (NASA, Goddard Space Flight Center, Greenbelt, MD) and R L KENNARD (Science Applications Research, Riverdale, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 . New York, Institute of Electrical and Electronics Engineers, 1984, p. 74-83 refs

The employment of Landsat Multispectral Scanner (MSS) data for surface coal mine inventory and inspection applications has been extensively investigated However, in spite of encouraging research results, MSS data have not gained wide acceptance for surface mine monitoring operations This situation is partly related to MSS spatial resolution (80 m), which is considered insufficient for detailed surface mine inspection The Thematic Mapper (TM) employed on the Landsat-4 and 5 satellites provides an improved resolution (30 m) and other refinements which are expected to enhance the usefulness of TM data relative to MSS data The present paper reports research which was conducted to assess the usefulness of actual TM data and to quantitatively evaluate the contribution of individual sensor characteristics to data utility for surface mine monitoring The obtained results demonstrate that the TM spatial resolution can be of immediate benefit for certain applications such as surface mine monitoring G R

A85-38846* California Univ , Santa Barbara
REGISTERING THEMATIC MAPPER IMAGERY TO DIGITAL ELEVATION MODELS
J FREW (California, University, Santa Barbara, CA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 432-435 refs
(Contract NAS5-27463)

The problems encountered when attempting to register Landsat Thematic Mapper (TM) data to U S geological survey digital elevation models (DEMs) are examined It is shown that TM and DEM data are not available in the same map projection, necessitating geometric transformation of one of the data type, that the TM data are not accurately located in their nominal projection, and that TM data have higher resolution than most DEM data, but oversampling the DEM data to TM resolution introduces systematic noise Further work needed in this area is discussed M D.

A85-38896
COMPLEX AERIAL AND SPACE REMOTE-SENSING STUDIES OF SIBERIA [KOMPLEKSNYE AEROKOSMICHESKIE ISSLEDOVANIIA SIBIRI]
A L IANSHIN, ED and L K ZIATKOVA, ED Novosibirsk, Izdatel'stvo Nauka, 1984, 96 p In Russian No individual items are abstracted in this volume

A collection of papers describing a Soviet program for the remote sensing of natural resources in Siberia and the Far East is presented The manifestation of various types of tectonic structures on space photographs is examined, and the significance of these structures for petroleum exploration is discussed Particular consideration is given to structural transition zones, the predictive significance of zones linking structures of different age, thematic mapping, and landscape divisions. Features characterizing morphological-tectonic and environment-protection mapping are discussed B J.

A85-39095
SPACE-BORNE IMAGERY INTERPRETATION - EARTHQUAKE STUDIES IN ASWAN
E M. EL SHAZLY and M A ABDEL HADY (Academy of Scientific Research and Technology, Remote Sensing Centre, Cairo, Egypt) (Universita di Napoli, Aeritalia S p A , ESA, and NASA, International Symposium on Spacelab 1 - Results, Implications and Perspectives, Naples and Capri, Italy, June 11-16, 1984) Earth-Oriented Applications of Space Technology (ISSN 0277-4488), vol 5, no 1-2, 1985, p 139-149 refs

Landsat imagery of an area near the epicenter of an earthquake event in Aswan, Egypt is analyzed in order to delineate geological features The tectonic, hydrological, and environmental conditions of the area affected by the earthquake were also investigated The Landsat imagery was used to develop a graph showing the distribution of surface fractures in the directions NNW-SSE and ENE-WSW Some possible causes of the earthquake event are discussed, including Nile water seepage from the Aswan High Dam and local plate movement produced by the accumulating pressure of superheated steam Several examples of Landsat imagery are provided I H

A85-39341
METHODS OF STRUCTURAL GEOLOGY AND GEOLOGICAL MAPPING [METODY STRUKTURNOI GEOLOGII I GEOLOGICHESKOGO KARTIROVANIIA]
I P KUSHNAREV, P I KUSHNAREV, and K M MELNIKOVA Moscow, Izdatel'stvo Nedra, 1984, 375 p In Russian refs

Methods of structural geology and geological mapping are examined with reference to the interpretation of various types of aerial photographs and the utilization of geophysical, geochemical, and geomorphological data to investigate the crustal structures Special emphasis is placed on microstructural analysis, calculations of the magnitudes of repeated fault displacements, and the mapping of coastal deposits B J

A85-39825
INVESTIGATION OF THE EARTH BY MEANS OF NEUTRINOS - NEUTRINO GEOLOGY
G A ASKARIAN (Akademiia Nauk SSSR, Institut Obshchei Fiziki, Moscow, USSR) (Uspekhi Fizicheskikh Nauk, vol 144, Nov 1984, p 523-530) Soviet Physics - Uspekhi (ISSN 0038-5670), vol 27, Nov 1984, p 896-900 Translation refs

Possible applications are described for high energy neutrino beams in the production of sound pulses, electrical currents, and electromagnetic fields for study of the earth and for geological research Forced conditions which increase the efficiency of the investigation are pointed out forced beam ejection, modulation, integrated fields, and so forth Author

N85-23191*# Earth Satellite Corp , Chevy Chase, Md
EVALUATION OF THEMATIC MAPPER PERFORMANCE AS APPLIED TO HYDROCARBON EXPLORATION
J R EVERETT, C SHEFFIELD, and J DYKSTRA *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 119-126 Jan 1985 ERTS
Avail NTIS HC A19/MF A01 CSCL 08G

The role data from the first three LANDSAT satellites have in geologic exploration and their current level of acceptance is reviewed and the advantages of LANDSAT 4 TM data over MSS data are discussed Specially enhanced Thematic Mapper imager can make a very significant contribution to the oil and gas and mineral exploration industries The TM's increased spatial resolution enables the production of larger scale imagery, which greatly increases the amount of geomorphic and structural information interpretable TM's greater spectral resolution, combined with the smaller, more homogeneous pixels, should enable a far greater confidence in mapping lithologies and detecting geobotanical anomalies from space The results from its applications to hydrocarbon and mineral exploration promise to bring the majority of the geologic exploration community into that final stage of acceptance and routine application of the satellite data. A R H

N85-23192*# Jet Propulsion Lab, California Inst of Tech, Pasadena
GEOLOGIC UTILITY OF LANSDAT-4 TM DATA
M ABRAMS, A B KAHLE, A GILLESPIE, J CONEL, and H LANG *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 127-130 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 08G

The performance of the TM vis-a-vis various geological applications was quantified by analyzing (1) the geological utility of the data with respect to the increased spatial resolution and number of bands (compared to the MSS), (2) the geometric accuracy, (3) the radiometric performance of the TM scanner Preliminary analyses were performed on TM scenes over Death Valley, California, and over southern Arizona Both scenes were acquired in CCT-PT format, where the data were geometrically and radiometrically corrected Overall, the TM data appears to contain a marked increase in geologically useful information, however, a number of instrumental or processing artifacts may well limit the ability of the geologist to fully extract this information A R H

N85-23195*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
ASSESSMENT OF COMPUTER BASED GEOLOGIC MAPPING OF ROCK UNITS IN THE LANDSAT-4 SCENE OF NORTHERN DEATH VALLEY, CALIFORNIA
N M SHORT *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 163-216 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 08G

Geologists obtain low accuracy levels when maps derived from LANDSAT MSS data are compared with those made by conventional methods Procedures developed for the IDIMS computer system and used to classify a subset of a TM image of the Death Valley, California - Nevada border are described Despite the superior resolution, broader spectral coverage, and greater sensitivity inherent to the TM, the actual recorded measured accuracy was in the same narrow range (30 to 60%) recorded for MSS data from earlier LANDSATs The supervised classification approach appears to be superior to the unsupervised approach when applied to vegetation-sparse surfaces composed of spectrally contrasting rock/soil units distributed in relatively flat to low relief terrain As spatial resolution improves and optimal spectral bands for identifying rock materials are specified, use of classified multispectral remote sensing data from air and space when coupled with supporting field calibration and checks should become the dominant way in which geologic mapping is carried out in future decades A R H

N85-23217*# MacQuarie Univ, North Ryde (Australia) School of Mathematics and Physics
GADB: A DATABASE FACILITY FOR MODELLING NATURALLY OCCURRING GEOPHYSICAL FIELDS
C N G DAMPNEY *In its* MAGSAT Anomaly Field Data of the Crustal Properties of Australia 12 p 1983 refs ERTS
Avail NTIS HC A05/MF A01 CSCL 05B

In certain kinds of geophysical surveys, the fields are continua, but measured at discrete points referenced by their position or time of measurement Systems of this kind are better modelled by databases built from basic data structures attuned to representing traverses across continua that are not of pre-defined fixed length The general Array DataBase is built on arrays (ordered sequencies of data) with each array holding data elements of one type The arrays each occupy their own physical data set, in turn inter-related by a hierarchy to other arrays over the same space/time reference points The GADB illustrates the principle that a data facility should reflect the fundamental properties of its data, and support retrieval based on the application's view The GADB is being tested by its use in NASA's project MAGSAT A R H

N85-23218*# MacQuarie Univ, North Ryde (Australia) Centre for Geophysical Exploration Research
DATA SELECTION TECHNIQUES IN THE INTERPRETATION OF MAGSAT DATA OVER AUSTRALIA
B. D JOHNSON and C N G DAMPNEY *In its* MAGSAT Anomaly Field Data of the Crustal Properties of Australia 6 p 1983 Presented at the 52nd Ann Meeting of the Soc of Exploration Geophys, Dallas, 17-21 Oct 1982 Original contains color imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A05/MF A01 CSCL 05B

The MAGSAT data require critical selection in order to produce a self-consistent data set suitable for map construction and subsequent interpretation Interactive data selection techniques are described which involve the use of a special-purpose profile-oriented data base and a colour graphics display The careful application of these data selection techniques permits validation every data value and ensures that the best possible self-consistent data set is being used to construct the maps of the magnetic field measured at satellite altitudes over Australia A R H

N85-24500# Joint Publications Research Service, Arlington, Va
TEMPERATURE ANOMALIES ABOVE ORE BODIES Abstract Only
V I GORNYY and V B YERMOLAYEV-MASLOV *In its* USSR Rept Earth Sci (JPRS-UES-85-004) p 73 13 Mar 1985 Transl into ENGLISH from Sov Geol (USSR), no 6, Jun 1984 p 113-119
Avail NTIS HC A05/MF A01

Temperature anomalies above ore bodies which can be revealed by aerial thermal surveys and field geothermal surveys are related to distortions of the quasisteady field of the Earth by ore bodies with heat conductivity differing from their surroundings, exothermal reactions related to oxidation of sulfide ores, and distortion of the variable heat field by objects with contrasting thermal properties Geothermal measurements in boreholes at shallow depths are used to analyze the nature of changes in temperatures with depth at an ore deposit on the southern slope of the Caucausus Temperature anomalies above ore bodies are found to be greatest at very shallow depths (about 1 meter) Variations in albedo above ore deposits result in nonuniform absorption of solar radiation with resulting temperature anomalies Regular changes in the amplitudes of temperature anomalies with time and depth indicate that they are closely related to external variable heat sources Author

N85-25341# Joint Publications Research Service, Arlington, Va
USE OF SPACE INFORMATION IN PETROLEUM- AND GAS-PROSPECTING WORK (EXAMPLE OF SOUTHERN MANGYSHLAK) Abstract Only
V T VOROBYEV and D S ORUDZHEVA *In its* USSR Rept Space (JPRS-USP-85-003) p 107-108 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 33-38
Avail NTIS HC A08/MF A01

Space information makes it possible to reveal new features of the geology of petroleum and gas regions The Mangyshlak region was used as an example revealing the effectiveness of its use in exploration work in already known producing regions High-resolution space photographs were used in studying the distribution and inheritance of structures, vertical neotectonic and recent movements, distribution of zones of compression and dilatation, nature and density of dislocations and relationship of known petroleum and gas deposits The following photointerpretation operations were performed ranking of lineaments and annular photoanomalies, analysis of hypsometric position and dissection of defined blocks for determining amplitudes of vertical neotectonic and recent movements, study of microrelief, species composition of vegetation, nature of ground cover and degree of ground moistening The detected petroleum and gas deposits in the Mangyshlak Basin are associated with zones of major neotectonic faults and recent dilatations, regions of positive recent vertical movements and local weak neotectonic uplifts and territories with average fracturing B G

N85-25342# Joint Publications Research Service, Arlington, Va
EXAMPLE OF JOINT USE OF DATA FROM SURFACE STUDIES AND SPACE PHOTOGRAPHS IN INVESTIGATING DYNAMICS OF ZONE OF NORTH ZERAVSHAN SEISMOGENIC FAULTS Abstract Only
A. I LAVRUSEVICH and D D BUZRUKOV *In its* USSR Rept Space (JPRS-USP-85-003) p 108-109 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 39-43 *Original language document announced* as A84-43206
Avail NTIS HC A08/MF A01

In the North Zeravshan fault zone the most important structural elements are dislocations, movements along which in large part determine the structural plan and geomorphological features of this area The results of traditional surface geological research, as well as information obtained from medium-scale black-and-white space photographs taken from a Cosmos satellite and the Salyut-6 orbital station, were used The geological and recent movements of the Zeravshan and Zaknmatabad faults are described Space photograph interpretation yields interesting and valuable information, such as an unusual configuration of the valleys of the left tributaries of Zeravshan River The lower reaches Interpretation of the drainage pattern in general revealed the important placements during the recent tectonic stage The recent tectonic activity manifested in the landscape and apparent on space photographs, light of proposed hydraulic construction on the Zeravshan River for the purpose of regulating its runoff B G

N85-25343# Joint Publications Research Service, Arlington, Va
RELATIVE GEOLOGICAL INFORMATION YIELD FROM SMALL-SCALE MULTIZONAL SPACE IMAGES (EXAMPLE OF FERGAMA DEPRESSION AND ITS MOUNTAINOUS MARGINS) Abstract Only
B G AZIMOV *In its* USSR Rept Space (JPRS-USP-85-003) p 109 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 44-49 Original language document announced as A84-43207
Avail NTIS HC A08/MF A01

More than 40 sets of space photographs covering the territory of the Fergana intermont depression and its mountainous margins were analyzed for clarifying the relative yield of geological information and the nature of image generalization on small-scale space photographs depending on change in spectral range The photographs used were from Meteor-Priroda satellites carrying multispectral TV apparatus and taking in four zones of the visible and near-IR ranges The spectral brightness coefficients (SBC) was used as the basic parameter A graph shows the change in spectral brightness coefficients of geological-geomorphological and other natural features as a function of the spectral range used Curves of the photoanomalies for the four types reveal distinctly different averaged SBC, indicating that in the visible range geological-geomorphological features are easily differentiated on the basis of reflectivity In the near-IR there is a minimum of information on surface geological-geomorphological features, but lines and bands correlating with zones of deep faults, uplifts and depressions of the buried basement stand out B G

N85-25353# Joint Publications Research Service, Arlington, Va
INTERPRETATION OF SPACE PHOTOLINEAMENTS Abstract Only
L. N ROZANOV and I N KALININA *In its* USSR Rept. Space (JPRS-USP-85-003) p 117 4 Mar 1985 Transl into ENGLISH from Sov Geol (USSR), no 9, Sep 1984 p 81-83
Avail NTIS HC A08/MF A01

A definite pattern of space photolineaments exists, most have northeasterly and northwesterly strikes The two main systems are traced in all platform regions. Seismic observations along regional profiles help in solving the fracture, the results of interpretation of space survey data should be compared with *seismogeological sections along regional profiles The comparisons* show that space photolineaments coincide well with faults both in the upper part of the crust and at considerable depths It is revealed that almost all lineaments coincide with dislocations or zones of increased permeability discriminated in the seismological sections, although not all the dislocations apparent in the sections are represented on space photographs It is postulated that only those *dislocations appear at the Earth's surface which are related to* the most recent tectonic activation Space photolineaments represent planetary fissuring manifested in the entire crust or its greater part The dislocations reflected on space photos and in seismic sections are for the most part zones of crustal dilatation *and circulation of fluids* E A K

N85-25927*# Arizona State Univ, Tempe Dept. of Geology.
ANALYSIS OF THE GRAN DESIERTO, PINACTE REGION, SONORA, MEXICO, VIA SHUTTLE IMAGING RADAR
R GREELEY, P R CHRISTENSEN, J F MCHONE, Y ASMEROM, and J R ZIMBELMAN 1984 106 p refs Sponsored by NASA
(NASA-CR-175711, JPL-9950-1026, NAS 1 26 175711) Avail NTIS HC A06/MF A01 CSCL 17I

The radar discriminability of geolian features and their geological setting as imaged by the SIR-A experiment is examined The Gran Desierto and Pincate volcanio field of Sonora, Mexico was used to analyze the radar characteristics of the interplay of aeolian features and volcano terrain The area in the Gran Desierto covers 4000 sq km and contains sand dunes of several forms The Pincate volcanio field covers more than 2 000 sq km and consists primarily of basaltic lavas Margins of the field, especially on the western and northern sides, include several maar and maar-like craters, thus obtaining information on their radar characteristics for comparison with impact craters B G

N85-26828# Joint Publications Research Service, Arlington, Va
ANALYSIS OF MESOFISSURING ON SPACE PHOTOGRAPHS. NEW TECHNIQUE FOR STUDY OF PETROLEUM AND GAS DEPOSITS Abstract Only
G I AMURSKIY, G A ABRAMENOK, and M N SOLOVYEV *In its* USSR Rept Space (JPRS-USP-85-004) p 86 6 May 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (Moscow), no 6, Nov - Dec 1984 p 36-41
Avail NTIS HC A06

Zones of mesofissuring are linear (or in the case of their intersection by systems of a different strike, linear-focal) zones of reduced density, within whose areas increased fluid conductivity of rocks is ensured by a branched system of so-called tectonic channels of different scales from ordinary disjunctive dislocations to microfissures On large-scale photographs these zones of mesofissuring can be discriminated in the form of zones of increased density of relatively short (0 5-4 km) lineaments with a width up to several kilometers and with a length of many tens of kilometers They are characterized by the following. (1) sustained orientation of individual elements, (2) complex unambiguous relationship to known faults, (3) nondependence on local plicative tectonics (the width of the zone of microfissuring frequently exceeds the dimensions of the folds, and (4) presence of systems of fissures of different morphology, such as stepped, sawtooth and echeloned arrangements) Since the formation of such zones results in the appearance of extended zones of intensive reduced density of rocks, their tracing and projection onto the level of productive strata can serve as a basis for solving important problems in study and exploitation of petroleum and gas deposits B W

N85-27350# Grenoble Univ (France)
A SEISMIC ARGOS DATA COLLECTION PLATFORM
G POUPINET and J P GLOT *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 6 p 1983 refs
Avail NTIS HC A16/MF A01

A network of seismic event detectors transmitting data via ARGOS was installed in the Pyrenees and Mount Etna Each ARGOS unit assumes precise GMT timing, transmission, and *earthquake detection by a comparison between the seismic signal* and a long term average The Pyrenees network was compared with a standard seismological network More than 80% of the automatic picks of earthquake P-arrivals are within 0 2 sec of

those performed by an operator playing back magnetic tapes The performance ARGOS for microearthquakes within the network are even better The ease in the installation of the equipment in the field and in processing the data independently of the number of detectors offers the possibility to complement present seismological networks to improve the precision in locating earthquakes and to monitor seismicity on a long term in remote zones Author (ESA)

05

OCEANOGRAPHY AND MARINE RESOURCES

Includes sea-surface temperature, ocean bottom surveying imagery, drift rates, sea ice and icebergs, sea state, fish location

A85-30599* Jet Propulsion Lab , California Inst of Tech , Pasadena
SATELLITE-DERIVED SEA SURFACE TEMPERATURE - WORKSHOP COMPARISONS
E G NJOKU (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) American Meteorological Society, Bulletin (ISSN 0003-0007), vol 66, March 1985, p 274-281 NASA-supported research refs

A series of three workshops was held between January 1983 and February 1984 to assess the current status of global sea surface temperature (SST) measurement from space Workshop participants included sensor scientists, radiative transfer specialists, and users of SST data in the disciplines of oceanography and climate Data from four satellite sensors (three infrared and one microwave) were evaluated by direct comparison with each other and with data from ships, XBTs, and buoys The satellite data showed good agreement in a global rms sense (about 0 5-1 0 C), but several anomalous regional biases were also observed The nature of these biases and techniques for their removal require further study Author

A85-30744
JOINT EXPERIMENTS PROGRAMME IN REMOTE SENSING OF MARINE FISH RESOURCES
A NARAIN, R N JADHAV, R M DWIVEDI, K L MAJUMDER, G P SHARMA (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), K M JOSEPH, V S SOMVANSHI (Fisheries Survey of India, Bombay, India), E G SILAS, P V R NAIR, G SUBBARAJU (Central Marine Fisheries Research Institute, Cochin, India) et al International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 569-576 refs

A85-30980
THEORY OF RADAR IMAGING OF INTERNAL WAVES
W ALPERS (Hamburg, Universitaet, Max-Planck-Institut fuer Meteorologie, Hamburg, West Germany) Nature (ISSN 0028-0836), vol 314, March 21, 1985, p 245-247 refs

Radar images taken over ocean areas, in particular those obtained by the synthetic aperture radar aboard the Seasat satellite in 1978, sometimes show features that seem to be surface manifestations of oceanic internal waves A theory is presented here which explains the large radar signatures of internal waves in which the imaging is attributed to variations in the short-scale surface roughness induced by current variations associated with internal waves C D

A85-31200*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
SURFACE RADIATION IN THE TROPICAL PACIFIC
M -D CHOU (NASA, Goddard Space Flight Center, Laboratory for Atmospheres, Greenbelt, MD) Journal of Climate and Applied Meteorology (ISSN 0733-3021), vol 24, Jan 1985, p 83-92 refs

Monthly surface radiative fluxes have been calculated for the tropical Pacific between January 1970 and February 1978, using a radiative transfer parameterization The radiative transfer parameterization included detailed treatments of the molecular and droplet absorptions, and surface and cloud reflections The input data used in the calculations were obtained from the National Climatic Center (NCC), the National Center for Atmospheric Research (NCAR), and from the University of Hawaii The results show that the distribution of surface radiation closely follows the distribution of cloudiness, and, to a lesser degree, humidity The rms net error in the surface radiation estimates was about 15 W per sq m, with the largest contribution from uncertainties in the cloud cover and humidity data The sensitivity of surface radiation parameterizations to input data errors is discussed, and some accuracy requirements for satellite retrievals of atmospheric and cloud parameters are proposed The calculations are presented in the annually-averaged maps of surface radiation variations I H

A85-31890
OPTICAL NONCONTACT METHODS FOR THE STUDY OF THE WORLD OCEAN [OPTICHESKIE NEKONTAKTNYE METODY ISSLEDOVANIIA MIROVOGO OKEANA]
V V POLOVINKO Moscow, Izdatel'stvo Nedra, 1984, 168 p In Russian refs

Remote-sensing and laser techniques for determining the characteristics of the ocean were assessed theoretically and experimentally Attention is given to linear system models of the noncontact laser sounding of the ocean and of the remote sensing of ocean waters and the continental shelf in the visible and near-infrared ranges The simulation of methods for the optical sounding of the ocean is discussed, and the synthesis of optical noncontact methods for measuring the characteristics of the ocean surface and bottom as well as of the main body of the ocean is described B J

A85-32103
PRELIMINARY RESULTS FROM SATELLITE SAR IMAGE SIMULATION EXPERIMENTS
A L GRAY, R K HAWKINS, C E LIVINGSTONE, L D ARSENAULT (Canada Centre for Remote Sensing, Ottawa, Canada), G WESSELS, and R LOWRY (Intera Environmental Consultants, Ltd , Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 13-23 refs

A process in which high-resolution airborne SAR imagery is systematically degraded in order to simulate spaceborne SAR imagery appropriate to RADARSAT or ERS-1, is discussed The image-simulation process consists of reducing the resolution from about 3 m to 25 m using various possible weighting functions in the range and azimuth direction The simulation uses aircraft SAR images of sea ice and icebergs (Beaufort Sea pack ice and Labrador Sea marginal ice with icebergs) which are acquired by the CCRS SAR-580 system The simulated images obtained by systematic variation of the final resolution, number of looks, and signal-to-noise ratio from the original images, are qualitatively analyzed The results support the contention that satellite SAR imagery will provide information on a scale and at a resolution that will be invaluable for large area strategic ice forecasting and operational planning Illustrations derived from digitally processed X-band data are presented M D

A85-32104
A SIMPLE MODEL FOR SATELLITE SAR RADIOMETRIC DISCRIMINATION ESTIMATION
A L. GRAY, R K HAWKINS, and C E LIVINGSTONE (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 25-38 refs

A simple model for radar-pixel brightness distributions which incorporates radar fading, thermal noise, and spatial variability of average backscatter and which can be used to estimate spaceborne SAR-image feature identification using radiometric classification and to simulate SAR imagery from high resolution aircraft imagery, is discussed Studies are carried out on the detection of small multi-year flows in a background of first-year ice and icebergs in the open ocean The importance of signature contrast is shown, and the improved performance of the C-band in relation to the L-band for the detection of multi-year flows in a cold Arctic ice pack is considered It is shown that the incidence angle and the windspeed are more important than the frequency for the detection of icebergs in the open ocean Graphs are used to illustrate the results M D

A85-32112
AUTOMATED COMPUTER MONITORING SEA-ICE TEMPERATURE BY USE OF NOAA SATELLITE DATA
A R CONDAL and H V LE (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 145-150

The present status of the Ice Status System (ISS) which is being developed at the Aerospace Meteorology Division of the Atmospheric Environment Service in Ontario, is discussed The program's goal is to develop a computer assisted image-analysis system for monitoring sea-ice temperature The system uses the advanced very high-resolution radiometer (AVHRR) data from the National Oceanic and Atmospheric Administration (NOAA) satellites and consists of three steps The processes of navigation, to within + or - 1 image pixel, and calibration of the data in function of percent albedo (visual channels) and temperature (infrared channels) are examined After the first two steps, a multiple-channel correction technique is applied to the data It is shown that this remapping capability provides the user with AVHRR data in which temporal as well as multispectral analysis can be performed Data and results from the Gulf of St Lawrence and Great Lakes areas, which are the test areas for the ISS program, are presented M D

A85-32118
COMPARISON OF METEOSAT-2 AND NOAA-7 DATA USED FOR UNDERSTANDING THE ENVIRONMENT OF ALBACORE IN THE EAST ATLANTIC [COMPARAISON DES DONNEES METEOSAT-2 ET NOAA-7 UTILISEES POUR LA CONNAISSANCE DE L'ENVIRONNEMENT DES THONS EN ATLANTIQUE EST]
J Y LE GALL and J CITEAU (Centre National pour l'Exploitation des Oceans Centre Oceanologique de Bretagne, Brest, France) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 211-221 In French refs

A85-32121
TRANSIENT SEA SURFACE HEIGHT VARIATION AND THE SEASAT-ALTIMETER DATA APPLICATION
W MOON (Manitoba, University, Winnipeg, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 273-282 Sponsorship Natural Sciences and Engineering Research Council of Canada refs
(Contract NSERC-A-7400)

The Seasat Geophysical Data Record (GDR) file includes a number of corrections for instruments, atmospheric effects, coastal effects and geophysical effects However, the transient sea surface variation due to the ocean circulation and wind surge is not implemented In this research an interactive numerical modelling scheme is developed to make this correction The application of the algorithm over the Hudson Bay area of Canada demonstrates that this technique can easily be applied to any regional oceanographic and geophysical research employing satellite altimeter data over a water-covered area Author

A85-32149
ON A VERIFICATION PLANE FOR MOS-1 (MARINE OBSERVATION SATELLITE-1)
K ARAI (National Space Development Agency of Japan, Earth Observation Systems Dept , Tokyo, Japan) and C ISHIDA (National Space Development Agency of Japan, Earth Observation Center, Hiki, Saitama, Japan) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 815-822 refs

Field measurement programs being carried out in Japan with visible, IR and microwave scanning radiometers (MSR) to acquaint the users with passive sensing data are described Emphasis is being placed on defining common features of data for marine and land surfaces and characterizing the sea surface using visible, IR and microwave frequencies The sensing instruments will eventually be installed on the 750 kg MOS-1 satellite in a 909 km orbit at 99 1 deg inclination The sensors will be carried on airborne surveys to gather imagery for comparisons with ground truth data regarding snow depth and density, frozen and melt snow, humidity, clouds, liquid and solid ice content, and the effects of high wind speeds over the ocean The field trials have thus far served in quantifying the effects of the viewing angle and frequency and the definition of a sidelobe correction factor M S K

A85-32166
THE WORLD OCEAN CIRCULATION EXPERIMENT
J D WOODS (Kiel, Universitaet, Kiel, West Germany) Nature (ISSN 0028-0836), vol 314, April 11, 1985, p 501-511 refs

The World Ocean Circulation Experiment (WOCE) is being planned to begin in 1990 as a survey of the global distribution of ocean variables, in order to significantly improve estimates of the circulation of heat, water, and chemicals over the world ocean as well as their exchanges with the atmosphere The data set thus obtained will be used to test computer models of the ocean circulation which are required by decadal climate change predictions Benefits are also anticipated for researchers in marine chemistry, biology, and geology. The World Climate Research Program, of which WOCE is an element, is divided into three 'streams' respectively concerned with climate prediction over periods of months, years, and decades, it is the last of these time scales that WOCE will address, allowing new determinations to be made on such specific phenomena as the climatic effects of CO2 pollution O C

A85-32192* Jet Propulsion Lab, California Inst of Tech, Pasadena
TOPEX GROUND DATA SYSTEM
S N ROSELL and C A YAMARONE, JR (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc, 1983, p 112-117 refs

The TOPEX Project is a proposed oceanographic mission to measure the topography of the sea surface for a period of three years This mission is sponsored by the National Aeronautics and Space Administration and managed by the Jet Propulsion Laboratory Measurements of topography are used to study ocean currents, tides, bathymetry and the oceanic geoid Several of the primary goals of this mission are to process and verify the altimetric data, and distribute them within days to the science investigators This paper describes the TOPEX end-to-end ground data system In addition to controlling the TOPEX satellite, the ground data system has been designed to minimize the time from data acquisition to science processing and data distribution A centralized design supports the favorable response time of the system and also allows for operational efficiencies Networking of real time and non-real time elements of the data system provides for more effective data processing Author

A85-32215* Jet Propulsion Lab, California Inst of Tech, Pasadena
EARTH AND SPACE SCIENCE - OCEANS
R H STEWART (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, University, Scripps Institution of Oceanography, La Jolla, CA) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc, 1983, p 295

Satellite observations of the oceans are now being used to obtain new information about the oceanic geoid, currents, winds, tides and the interaction of the ocean with the atmosphere In addition, satellites routinely relay information from the sea surface to laboratories on land, and determine the position of instruments drifting on the sea surface Author

A85-32872
INVESTIGATION OF THE ATMOSPHERIC AEROSOLS AND WATER VAPOR BY THE AVHRR RADIOMETER (VISIBLE AND IR) ON BOARD NOAA-7
T TAKASHIMA and Y TAKAYAMA (Meteorological Research Institute, Tsukuba, Ibaraki, Japan) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 90-93 refs

An attempt is made to improve the accuracy of sea surface temperature measurements from space through the inclusion of atmospheric correction obtained by multispectral observations by the Advanced Very High Resolution Radiometer (AVHRR) onboard the NOAA-7 satellite The radiometer detects the emitted radiation in the IR window channels 3 55-3 93, 10 5-11 5, and 11 5-12 5 microns, together with the reflected radiation in the visible window channels 0 58-0 68 and 0 725-1 10 micron Model computations, compared to the full-scale data, indicate that the presence of water vapor under clear conditions results in an insignificant change in the albedo, in the sunglint under hazy conditions the albedo difference due to wind and visibility conditions changes monotonically with an increase of the zenith angle of observations L T

A85-35047*# California Univ, La Jolla
ESTIMATING OCEAN PRODUCTION FROM SATELLITE-DERIVED CHLOROPHYLL - INSIGHTS FROM THE EASTROPAC DATA SET
R W EPPLEY, E STEWART (California, University, La Jolla, CA), M R ABBOTT (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, University, La Jolla, CA), and R W OWEN (NOAA, National Marine Fisheries Service, La Jolla, CA) Scientific Committee on Oceanograpic Research, Symposium on Vertical Motion in the Equatorial Upper Ocean and Its Effects Upon Living Resources, Paris, France, May 6-10, 1985, Paper 7 p refs
(Contract NAGW-458)

The EASTROPAC expedition took place in 1967-68 in the eastern tropical Pacific Ocean Primary production was related to near-surface chlorophyll in these data Much of the variability in the relation was due to the light-history of the phytoplankton and its photoadaptive state This was due to changes in the depth of mixing of the surface waters more than changes in insolation Accurate estimates of production from satellite chlorophyll measurements may require knowledge of the temporal and spatial variation in mixing of this region Author

A85-35164
THEORY OF SYNTHETIC APERTURE RADAR OCEAN IMAGING - A MARSEN VIEW
K HASSELMANN (Max-Planck-Institut fuer Meteorologie, Hamburg, West Germany), R K RANEY (Canada Centre for Remote Sensing, Ottawa, Canada), W J PLANT (U S Navy, Naval Research Laboratory, Washington, DC), W ALPERS (Hamburg, Universitaet, Max-Planck-Institut fuer Meteorologie, Hamburg, West Germany), R A SHUCHMAN, D R LYZENGA (Michigan, Environmental Research Institute, Ann Arbor, MI), C L RUFENACH (NOAA, Wave Propagation Laboratory, Boulder, CO), and M J TUCKER (Institute of Oceanographic Sciences, Somerset, England) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 4659-4686 refs

This paper reviews basic synthetic aperture radar (SAR) theory of ocean wave imaging mechanisms, using both known work and recent experimental and theoretical results from the Marine Remote Sensing (MARSEN) Experiment Several viewpoints that have contributed to the field are drawn together in a general analysis of the backscatter statistics of a moving sea surface A common focus for different scattering models is provided by the mean image impulse response function, which is shown to be identical to the (spatially varying) frequency variance spectrum of the local complex reflectivity coefficient From the analysis has emerged a more complete view of the SAR imaging phenomenon than has been previously available A new, generalized imaging model is proposed Author

A85-35165* Oregon State Univ, Corvallis
A REVIEW OF SATELLITE ALTIMETER MEASUREMENT OF SEA SURFACE WIND SPEED - WITH A PROPOSED NEW ALGORITHM
D B CHELTON (Oregon State University, Corvallis, OR) and P J MCCABE (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 4707-4720 refs
(Contract NAS7-100)

The scheduled February 1985 launch of a radar altimeter aboard the U S Navy satellite Geosat has motivated an in-depth investigation of wind speed retrieval from satellite altimeters The accuracy of sea surface wind speed estimated by the Seasat altimeter is examined by comparison with wind speed estimated by the Seasat scatterometer The intercomparison is based on globally distributed spatial and temporal averages of the estimated wind speed It is shown that there are systematic differences between altimeter and scatterometer wind speed estimates These differences are traced to errors in the Seasat altimeter geophysical data record wind speed algorithm A new algorithm is proposed which yields consistent estimates from the two satellite sensors Using this new algorithm, the rms difference between spatial and

temporal averages of the two wind speed estimates is less than 1 m/s, and their correlation is greater than 0 9 Author

A85-35166* Jet Propulsion Lab , California Inst of Tech , Pasadena
OBSERVING LARGE-SCALE TEMPORAL VARIABILITY OF OCEAN CURRENTS BY SATELLITE ALTIMETRY - WITH APPLICATION TO THE ANTARCTIC CIRCUMPOLAR CURRENT
L.-L FU (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and D B CHELTON (Oregon State University, Corvallis, OR) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 4721-4739 refs

A new method is developed for studying large-scale temporal variability of ocean currents from satellite altimetric sea level measurements at intersections (crossovers) of ascending and descending orbit ground tracks Using this method, sea level time series can be constructed from crossover sea level differences in small sample areas where altimetric crossovers are clustered The method is applied to Seasat altimeter data to study the temporal evolution of the Antarctic Circumpolar Current (ACC) over the 3-month Seasat mission (July-October 1978) The results reveal a generally eastward acceleration of the ACC around the Southern Ocean with meridional disturbances which appear to be associated with bottom topographic features This is the first direct observational evidence for large-scale coherence in the temporal variability of the ACC It demonstrates the great potential of satellite altimetry for synoptic observation of temporal variability of the world ocean circulation Author

A85-35167* Naval Postgraduate School, Monterey, Calif
A COOL ANOMALY OFF NORTHERN CALIFORNIA - AN INVESTIGATION USING IR IMAGERY AND IN SITU DATA
M M RIENECKER, C N K MOOERS (U S Naval Postgraduate School, Monterey, CA), D E HAGAN (California Institute of Technology, Pasadena, CA), and A R ROBINSON (Harvard University, Cambridge, MA) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 4807-4818 Navy-NASA-sponsored research refs

The OPTOMA (Ocean Prediction Through Observation, Modeling and Analysis) program is developing an ocean descriptive-predictive system for four-dimensional data assimilation It is presently concerned with the mesoscale variability in the California Current System (CCS) The present paper has the objective to assess the relationship of surface temperature structure to subsurface temperature structure and flow fields Surface temperature anomalies are related to the mesoscale horizontal advective and subsurface mass fields The cool anomaly off northern California in summer 1982 is discussed, taking into account the temperature structure along transects, T-S variations and inferred water masses, variation of horizontal temperature patterns with depth, and synoptic information from IR data Author

A85-35169* Oregon State Univ , Corvallis
COMMENT ON 'SEASONAL VARIATION IN WIND SPEED AND SEA STATE FROM GLOBAL SATELLITE MEASUREMENTS' BY D. SANDWELL AND R. AGREEN
D B CHELTON (Oregon State University, Corvallis, OR) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 5001-5008.
(Contract NAS7-100)

A85-35170* Jet Propulsion Lab , California Inst of Tech , Pasadena
SUMMER ARCTIC SEA ICE CHARACTER FROM SATELLITE MICROWAVE DATA
F D CARSEY (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 5015-5034 refs

It is pointed out that Arctic sea ice and its environment undergo a number of changes during the summer period Some of these changes affect the ice cover properties and, in turn, their response to thermal and mechanical forcing throughout the year The main objective of this investigation is related to the development of a method for estimating the areal coverage of exposed ice, melt ponds, and leads, which are the basic surface variables determining the local surface albedo The study is based on data obtained in a field investigation conducted from Mould Bay (NWT), Nimbus 5 satellite data, and Seasat data The investigation demonstrates that microwave data from satellites, especially microwave brightness temperature, provide good data for estimating important characteristics of summer sea ice cover G R

A85-35171* Kansas Univ Center for Research, Inc , Lawrence
ACTIVE MICROWAVE MEASUREMENTS OF ARCTIC SEA ICE UNDER SUMMER CONDITIONS
R G ONSTOTT and S P GOGINENI (University of Kansas Center for Research, Inc , Lawrence, KS) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 5035-5044 refs
(Contract NAGW-334, N00014-76-C-1105)

Radar provides a valuable tool in the study of sea-ice conditions and the solution of sea-ice operational problems For this reason, the U S and Canada have conducted studies to define a bilateral synthetic aperture radar (SAR) satellite program The present paper is concerned with work which has been performed to explore the needs associated with the study of sea-ice-covered waters The design of a suitable research or operational spaceborne SAR or real aperture radar must be based on an adequate knowledge of the backscatter coefficients of the ice features which are of interest In order to obtain the needed information, studies involving the use of a helicopter were conducted In these studies L-C-X-Ku-band calibrated radar data were acquired over areas of Arctic first-year and multiyear ice during the first half of the summer of 1982 The results show that the microwave response in the case of sea ice is greatly influenced by summer melt, which produces significant changes in the properties of the snowpack and ice sheet G R

A85-35172* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
PROCESSES AND IMAGERY OF FIRST-YEAR FAST SEA ICE DURING THE MELT SEASON
B HOLT (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and S A DIGBY (Canada Centre for Remote Sensing, Ottawa, Canada) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 5045-5062 Research supported by RADARSAT, Canada Centre for Remote Sensing, Department of Energy, Mines and Resources of Canada, Atmospheric Environment Service of Canada, and NASA refs

In June and July 1982, a field program was conducted in the Canadian Arctic on Prince Patrick Island to study sea ice during the melt season with in situ measurements and microwave instrumentation operated near the surface and from aircraft The objective of the program was to measure physical characteristics together with microwave backscatter and emission coefficients of sea ice during this major period of transition The present paper is concerned with a study of both surface measurements and imagery of first-year fast ice during the melt season The melting process observed in first-year fast ice was found to begin with the gradual reduction of the snow cover For a two- to three-day period in this melt stage, a layer of superimposed ice nodules formed at the snow/ice interface as meltwater froze around ice and snow grains G R

A85-35173* Washington Univ , Seattle
TEMPORAL VARIATIONS OF THE MICROWAVE SIGNATURES OF SEA ICE DURING THE LATE SPRING AND EARLY SUMMER NEAR MOULD BAY, NWT
T C GRENFELL (Washington, University, Seattle, WA) and A W LOHANICK (U S Naval Ocean Research and Development Activity, National Space Technology Laboratories Station, Bay St Louis, MS) Journal of Geophysical Research (ISSN 0148-0227), vol 90, May 20, 1985, p 5063-5074 NASA-supported research refs
(Contract N00014-81-K-0460)

It has been shown that passive microwave imagery obtained from satellite-borne sensors provides an important basis for the study of the polar regions Because of the optical thinness of high-latitude clouds at microwave frequencies, radiometry can provide all-weather all-time observing capability However, in order to clarify observational uncertainties and investigate the information content of passive microwave imagery, detailed ground-based observations are needed Multifrequency data are also required to utilize the strong spectral dependence of both the dielectric properties of liquid water and volume scattering The present investigation has the aim to provide information of the considered type for the calibration and interpretation of satellite observations of the Arctic during the summer season Attention is given to instruments and calibration, the field program and the state of the ice cover, and the results G R

A85-35832
INVESTIGATIONS OF THE OCEAN SURFACE BY RADIOPHYSICAL MEANS FROM AEROSPACE PLATFORMS [ISSLEDOVANIE POVERKHNOSTI OKEANA RADIOFIZICHESKIMI SREDSTVAMI S AEROKOSMICHESKIKH NOSITELEI]
V B EFIMOV, A I KALMYKOV, V A KOMIAK, A S KUREKIN, A P PICHUGIN, A B FETISOV, V N TSYMBAL, V P SHESTOPALOV, S A SHILO, and S A VELICHKO (Akademiia Nauk Ukrainskoi SSR, Institut Radiofiziki i Elektroniki, Kharkov, Ukrainian SSR) Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana (ISSN 0002-3515), vol 21, April 1985, p 349-357 In Russian refs

Results of observations of regions of the ocean by spaceborne (Kosmos-1500 satellite) and airborne side-looking radars and scanning radiometers operating in the millimeter spectral region are discussed Radar images of the Pacific Ocean south of Kuril Islands are also analyzed, they reveal the presence of mesoscale inhomogeneities on the ocean surface with typical dimensions of 5-20 km and radar contrasts of 2-5 dB It is pointed out that the side-looking radar is effective in detecting active substances on the surface of the ocean, this is demonstrated using images of the Sea of Japan and of the vicinity of two islands L T

A85-35879
AIRBORNE MEASUREMENTS OF THE SEA STATE FROM MIRROR REFLECTIONS OF THE BEAM OF A CONTINUOUS-WAVE LASER [SAMOLETNYE IZMERENIIA MORSKOGO VOLNENIIA PO ZERKAL'NYM OTRAZHENIIAM LUCHA NEPRERYVNOGO LAZERA]
F V BUNKIN, K I VOLIAK, A I MALIAROVSKII, V G MIKHALEVICH, M V SOLNTSEV, T B SHEVCHENKO, and I V SHUGAN (Akademiia Nauk SSSR, Institut Obshchei Fiziki, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol 281, no 6, 1985, p 1441-1445 In Russian refs

A85-36427
MEASUREMENT OF THE CONDITION OF THE SEA BY IONOSPHERIC BACKSCATTER RADAR [MESURE DE L'ETAT DE LA MER PAR UN RADAR A RETRODIFFUSION IONOSPHERIQUE]
J PARENT DU CHATELET (Etablissement d'Etudes et de Recherches Meteorologiques, Boulogne-Billancourt, Hauts-de-Seine, France) Navigation (Paris) (ISSN 0028-1530), vol 33, April 1985, p 165-172 In French

The principles of meteo-oceanic parameter measurements are introduced, and the HF sky-wave radar equipment at Valensole is described The maximum range of the radar, which depends on the reflector-layer altitude and on the frequency used, varies between 2500 and 4000 km Consideration is given to the question of how to recognize the noise signal that is received and how to extract from it the information concerning the sea surface The solution involves not only the detection of the echo amplitude but also a comparison of the phase of the received signal with that of the emitted signal Results are presented which show that wind-directions measured by the radar are in good agreement with meteorological maps M D

A85-36570
ON THE MICROWAVE REFLECTIVITY OF SMALL-SCALE BREAKING WATER WAVES
M L BANNER (New South Wales, University, Kensington, Royal Australian Navy, Research Laboratory, Darlinghurst, New South Wales, Australia) and E H FOOKS (New South Wales, University, Kensington, Australia) Royal Society (London), Proceedings, Series A - Mathematical and Physical Sciences (ISSN 0080-4630), vol 399, May 8, 1985, p 93-109 Research supported by the Royal Australian Navy and University of New South Wales refs

The aim of this paper is to elucidate the microwave reflectivity properties of small-scale breaking water waves, which are a widespread feature of the wind-driven air-sea interface By using a laboratory wave flume in which a small-scale breaking wave was held stationary against an opposing current, a detailed investigation of the microwave reflectivity at X-band revealed significantly enhanced levels of local backscattered power from the crest regions of small-scale breaking waves A surprising level of organization is discovered in the hydrodynamic disturbances generated in such breaking zones Their wavenumber-frequency spectral properties are reported in detail, from which it is concluded that the microwave reflectivity is consistent with Bragg scattering from these disturbances The application of these findings to active microwave remote sensing of the oceans is discussed Author

A85-37114
DETERMINATION OF SEA-ICE CONCENTRATION ACCORDING TO SATELLITE IMAGERY [OPREDELENIE SPLOCHENNOSTI MORSKIKH L'DOV PO AEROKOSMICHESKIM IZOBRAZHENIIAM]
V IU ALEKSANDROV, A V BUSHUEV, and V S LOSHCHILOV (Gosudarstvennyi Komitet SSSR po Gidrometeorologii i Kontroliu Prirodnoi Sredy, Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skii Institut, Leningrad, USSR) Issledovanie Zemli iz Kosmosa (ISSN 0205-9614), Mar -Apr 1985, p 5-11 In Russian refs

Analytical expressions are derived to determine the concentration of sea-ice according to satellite imagery Two versions of an interactive computer algorithm for processing sea-ice imagery are proposed, based on the analytical expressions Sample photographs of sea-ice formations obtained by the Meteor-25 satellite are provided I H

A85-37269*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
AN EVALUATION OF 685 NM FLUORESCENCE IMAGERY OF COASTAL WATERS
H H KIM (NASA, Goddard Space Flight Center, Greenbelt, MD, Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Optoelektronik, Oberpfaffenhofen, West Germany), H VAN DER PIEPEN, V AMANN (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Optoelektronik, Oberpfaffenhofen, West Germany), and R DOERFFER (Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schiffahrt mbH, Geesthacht, West Germany) ESA Journal (ISSN 0379-2285), vol 9, no 1, 1985, p 17-27 refs

To evaluate the possible application of sunlight-illuminated fluorescence at 685 nm for remote sensing of phytoplankton concentrations, an ocean-color scanner is flown on an aircraft The results of an analysis of the scanner data, obtained from a series of test flights conducted along the Elbe River and its estuary in the North Sea, show that 685 nm fluorescence is a promising remote-sensing method The observation of a strong correlation between the fluorescence yields and the chlorophyll concentrations determined by the absorption method which uses the reflectance ratio of blue/green channels, is discussed The two methods are compared and it is shown that the fluorescence method has an edge over the other due to the data-processing algorithm and its applicability for surveying bio-resources in all types of water Photographs of the chlorophyll patterns are presented M D

A85-37511
A METHOD FOR DETERMINING ANTARCTIC LAND ICE PARAMETERS FROM SATELLITE MULTICHANNEL MICROWAVE MEASUREMENTS [METODIKA OPREDELENIIA PARAMETROV MATERIKOVOGO L'DA ANTARKTIDY PO DANNYM MNOGOKANAL'NYKH SVCH IZMERENII S ISZ]
IU G SPIRIDONOV and V V OZERKINA IN Methods for the remote sensing from space of meteorological parameters of the atmosphere Leningrad, Gidrometeoizdat, 1984, p 118-128 In Russian refs

A method is proposed for determining the parameters of random inhomogeneities of land ice from satellite microwave measurements at three wavelengths A description of the algorithm, results of model calculations, and preliminary results of determining the Antarctic land ice parameters are included The latter are based on radiometric thermal radiation measurements performed by the Meteor-Priroda satellite at wavelengths of 0 8, 1 35, and 4 cm It is pointed out that the main source of error during the interpretation of data is the discrepancies among the sighting angles and, therefore, radiation incidence angles at difference wavelengths L T

A85-37729
MARINE AEROSOL OPTICAL DEPTH FROM SATELLITE-DETECTED RADIANCE
P A DURKEE, E E HINDMAN, T H VONDER HAAR (Colorado State University, Fort Collins, CO), and D R JENSEN (U S Naval Ocean Systems Center, San Diego, CA) IN Conference on Satellite/Remote Sensing and Applications, Clearwater Beach, FL, June 25-29, 1984, Preprints Boston, MA, American Meteorological Society, 1984, p 11-14 refs
(Contract N00014-79-C-0793, NAVY PROJECT WR03302)

The use of satellite-borne sensors to determine aerosol optical depth (AOD) and/or relative humidity (RH) over water is investigated experimentally by comparing almost simultaneous Nimbus-7 Coastal Zone Color Scanner and NOAA-7 AVHRR images with airborne measurements of atmospheric state variables and aerosol particle size, number, and composition obtained off the coast of southern California on October 7, 1982 The results are presented in graphs and discussed It is found that satellite-detected radiance is positively correlated with AOD, that extinction is related to RH in the marine boundary layer (permitting the use of satellite radiance data to estimate RH), and that particles above the boundary layer can be detected (in significant amounts) from the ratio of red to near-IR radiance T K

A85-37752*
ARCTIC ATMOSPHERE - ICE INTERACTION STUDIES USING NIMBUS-7 SMMR
M. R ANDERSON and R G CRANE (Cooperative Institute for Research in Environmental Sciences, Boulder, CO) IN Conference on Satellite/Remote Sensing and Applications, Clearwater Beach, FL, June 25-29, 1984, Preprints Boston, MA, American Meteorological Society, 1984, p 132-136 refs
(Contract NAGW-363, NSF DPP-81-7265)

The use of data from the Scanning Multichannel Microwave Radiometer (SMMR) on board Nimbus 7 for studying ice-atmosphere interactions is discussed with reference to two case studies, one for the Greenland Sea and the other for the Sea of Okhotsk, for April/May 1979 By using SMMR data, rapid changes in ice extent and concentration have been observed in association with changes in synoptic atmospheric circulation Case studies and analyses of sample data indicate that ice concentration estimates may be accurate to within 10 percent V L.

A85-37754* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
SATELLITE DERIVED ATMOSPHERE WATER VAPOR AS A TRACER OF LARGE SCALE INTERACTIONS BETWEEN THE ATMOSPHERE AND OCEAN
D A SHORT and C PRABHAKARA (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) IN *Conference on Satellite/Remote Sensing and Applications*, Clearwater Beach, FL, June 25-29, 1984, Preprints Boston, MA, American Meteorological Society, 1984, p 143-148 refs

Two water-vapor distributions and the accompanying circulation patterns which occurred over the North and South Atlantic Ocean during February 1979 are described It is shown that scanning multichannel microwave radiometer observations from the Nimbus-7 satellite are used to remotely sense the vertically integrated atmospheric water vapor and liquid water, and the surface wind speed over the ocean and that they provide information on the ocean-atmosphere interaction To provide evidence of the events revealed in the satellite observations, FGGE data are used M D

A85-37979
MAPPING OF COASTAL-WATER TURBIDITY USING LANDSAT IMAGERY
L T LINDELL (Statens Naturvardsverk, Uppsala, Sweden), O STEINVALL, TH CLAESSON (Forsvarets Forskningsanstalt, Linkoping, Sweden), and M JONSSON (SAAB-Scania AB, Forsvarets Forskningsanstalt, Linkoping, Sweden) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 629-642 Research sponsored by the Swedish Board for Space Activities, Forsvarets Forskningsanstalt and Statens Naturvardsverk refs

Secchi disk depth was recorded in the field all along the Swedish coastline and compared with LANDSAT data Chromaticity analysis was applied in the evaluation to allow for sun angle and atmospheric corrections The data were used to study the relative nutrient and solids loading situations around the Swedish coast and as a basis for the applicability of laser bathymetry for water depth soundings Author

A85-37986
EVALUATION OF SENSITIVITY DECAY OF COASTAL ZONE COLOUR SCANNER (CZCS) DETECTORS BY COMPARISON WITH IN SITU NEAR-SURFACE RADIANCE MEASUREMENTS
S M SINGH, A P CRACKNELL (Dundee, University, Dundee, Scotland), and D SPITZER (Nederlands Instituut voor Onderzoek der Zee, Ab Den Burg, Netherlands) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 749-758 Research supported by the Science and Engineering Research Council of England refs

A85-37987* National Aeronautics and Space Administration Langley Research Center, Hampton, Va
BRIGHT SPOT ANALYSIS OF OCEAN-DUMP PLUMES USING LANDSAT MSS
D E BOWKER (NASA, Langley Research Center, Hampton, VA) and S R LECROY (Kentron International, Inc , Hampton, VA) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 759-771 refs

Identifying ocean-dumped materials by analysing the upwelled solar energy from the plume is complicated by the dispersion of the plume and the spectral absorption of the water It is shown that the spectral analysis of ocean-dump plumes, using Landsat multispectral scanner (MSS) data, should be confined to the brightest area within the plume, the region where the waste material is least dispersed and nearest the surface The decay of the upwelled radiance with time of the brightest pixel within the plume, at least for iron acid waste, is predictable An accurate age determination of an acid plume is limited by striping within the MSS data Author

A85-38578
ASSESSMENT OF SOME METHODS FOR INCREASING THE INFORMATION CONTENT OF AN ACTIVE-PASSIVE MICROWAVE REMOTE SENSING SYSTEM [OTSENKA NEKOTORYKH SPOSOBOV POVYSHENIIA INFORMATIVNOSTI AKTIVNO-PASSIVNOGO SVCH KOMPLEKSA DISTANTSIONNOGO ZONDIROVANIIA]
M O DRABKIN and S M SERGUNIN IN Radio-physical method for the study of the natural environment Leningrad, Gidrometeoizdat, 1984, p 12-21 In Russian refs

An assessment is made of several methods for increasing the information content of an airborne remote sensing system, consisting of a side-looking radar and a microwave radiometer, while decreasing instrumental errors The analysis takes into account the effects of aircraft roll, variations in the signal-to-noise ratio, space-time averaging of signals reflected from the underlying surface, and improvements in the calibration accuracy of the two instruments It is concluded that the methods considered provide for a considerable increase in the information content of the system The age determination of sea ice is considered as an application of the system described L T

A85-38681
METHODS FOR THE METEOROLOGICAL INTERPRETATION OF SATELLITE SPECTRAL MEASUREMENTS [METODY METEOROLOGICHESKOI INTERPRETATSII SPUTNIKOVYKH SPEKTRAL'NYKH IZMERENII]
A I BURTSEV, ED and A B USPENSKII, ED Leningrad, Gidrometeoizdat (Gosudarstvennyi Nauchno-Issledovatel'skii Tsentr Izucheniia Prirodnykh Resursov, No 16), 1984, 144 p In Russian For individual items see A85-38682 to A85-38696

Contributions deal with the methods for the derivation of quantitative meteorological information from satellite radiometric measurements in the IR and microwave spectral regions The topics discussed include the remote sensing of vertical temperature and humidity profiles in the atmosphere, determination of water surface temperature, characterization of wind based on cloud observations from geostationary satellites, and assessment of the longwave component of radiation balance Methods for computing the emissivity of the Antarctic land ice are presented, as well as several numerical experiments L T

A85-38712
DISTINGUISHING HOMOGENEOUS REGIONS OF WATER SURFACES ON THE BASIS OF SPACE IMAGERY [VYDELENIE ODNORODNYKH ZON VODNYKH POVERKHNOSTEI PO DANNYM KOSMICHESKOI S'EMKI]
S M SAZHIN IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 61-70 In Russian

The digital processing techniques used for the sea surface data retrieved from the MSU-4M instrument onboard the Meteor satellite, operating in spectral regions of 0 5-0 6, 0 6-0 7, 0 7-0 8, and 0 8-1 1 micron, are outlined Numerical experiments are performed in which those regions of Azov Sea images that are homogneous with respect to their spectral parameters ae distinguished The numerical experiments indicate that the proposed method for thermatic analysis can be used successfully for near-real-time processing The remote sensing data are compared to shipborne observations L T

A85-38819
DIGITAL PROCESSING OF SINGLE-BAND (33.6 GHZ) MICROWAVE IMAGERY FOR SEA ICE CLASSIFICATION
L D FARMER and D T EPPLER (U S Navy, Bay St Louis, MS) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 167-173 refs

The Ka-band Radiometric Mapping System (KRMS) program has mainly the objective to develop an operational imaging system which can produce detailed information concerning sea ice conditions over broad regions of the arctic In connection with this aim, methods suitable for automated classification of different ice types from remotely sensed data are being studied The present investigation is concerned with a simple classification method which is based on Ka-band brightness temperatures alone The method represents an initial step toward automated classification of Ka-band images of ice The investigation has the purpose to define the extent to which KRMS brightness temperature data alone can be used to discriminate between winter ice types It is found that open water, new ice, old ice, and young/first-year ice are segmented reliably However, second-year ice is indistinguishable from multilayer ice, and young ice is indistinguishable from first-year ice G R

A85-38866* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
AIRBORNE DOPPLER RADAR VELOCITY MEASUREMENTS OF PRECIPITATION SEEN IN OCEAN SURFACE REFLECTION
D ATLAS (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Maryland, University, College Park, MD) and T J MATEJKA (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD, National Center for Atmospheric Sciences, Boulder, CO) Journal of Geophysical Research (ISSN 0148-0227), vol 90, June 20, 1985, p 5820-5828 refs

The use of airborne or spaceborne radars to observe precipitation simultaneously directly and in reflection could provide significant new opportunities for measuring the properties of the precipitation, wind field, and ocean surface Atlas and Meneghini (1983) have proposed that the difference between direct and reflected precipitation echo intensities observed with a nadir-directed beam is a measure of two-way attenuation and thus of path average rain rate, taking into account an employment of direct and reflected echoes from very near the ocean surface to normalize for ocean surface scatter In the present paper, some key meteorological and oceanographic research applications are illustrated, giving particular attention to airborne Doppler radar velocity measurements of the precipitation G R

N85-22860# Admiralty Underwater Weapons Establishment, Portland (England)
THE IMAGING OF INTERNAL WAVES BY THE SEASAT-A SYNTHETIC APERTURE RADAR
M T BAGG and K I JOHNSON (Newcastle-upon-Tyne Polytechnic, England) Aug 1984 28 p refs
(ARE(PORTLAND)TN-720/84, BR93397) Avail NTIS HC A03/MF A01

Results from 5 million sq km of optical survey processed SEASAT-SAR imagery of the Northeast Atlantic are presented Markings attributed to internal wave activity were collated on maps with the bathymetry and surface meteorology Two thirds of the imagery shows evidence of such activity The markings occur

extensively at locations from Iceland to the Azores Simple analysis techniques were applied systematically to compare the very large data sets involved The characteristics of the internal wave features are discussed Imagery of the region between Scotland and Iceland is studied Author (ESA)

N85-23203*# Delaware Univ , Newark Coll of Marine Studies
ASSESSING LANDSAT TM AND MSS DATA FOR DETECTING SUBMERGED PLANT COMMUNITIES
S G ACKLESON and V KLEMAS *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 325-336 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 08B

The spectra, spacial, and radiometric characteristics of LANDSAT TM and MSS data for detecting and monitoring submerged plant communities were assessed The following preliminary results focus upon the spectral aspects of the problem in which a submerged plant canopy is to be distinguished from a surrounding bottom of sand or mud The effectiveness of an orbiting sensor in discriminating between submerged features and how strongly the bottom signal is attenuated by the water column In optically shallow water the inherent contrast is the controlling factor Thus, the optimum sensor band is that which correlates with the greatest inherent contrast between the submerged features In optically deeper water, the optimum sensor band is that in which the bottom signal is attenuated the least Author

N85-23237*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
CHARACTERISTIC VECTOR ANALYSIS OF INFLECTION RATIO SPECTRA: NEW TECHNIQUE FOR ANALYSIS OF OCEAN COLOR DATA
G W GREW Apr 1985 26 p refs
(NASA-TP-2428, NAS 1 60 2428, L-15885) Avail NTIS HC A03/MF A01 CSCL 05B

Characteristic vector analysis applied to inflection ratio spectra is a new approach to analyzing spectral data The technique applied to remote data collected with the multichannel ocean color sensor (MOCS), a passive sensor, simultaneously maps the distribution of two different phytopigments, chlorophyll alpha and phycoerythrin, the ocean The data set presented is from a series of warm core ring missions conducted during 1982 The data compare favorably with a theoretical model and with data collected on the same mission by an active sensor, the airborne oceanographic lidar (AOL) E A K

N85-23271*# Pennsylvania State Univ , University Park Dept of Meteorology
ANALYSIS OF THE INFLOW LAYER AND AIR-SEA INTERACTIONS IN HURRICANE FREDERIC (1979) Annual Progress Report
W M FRANK Apr 1985 8 p refs
(Contract NAG5-398)
(NASA-CR-175616, NAS 1 26 175616) Avail NTIS HC A02/MF A01 CSCL 04B

The current study is attempting to overcome the problem of uncertain heights of the satellite winds The effective heights of the satellite wind vectors were determined Satellite, aircraft, rawinsonde and surface wind measurements were integrated into a three dimensional analysis of the storm in flow layer over water Similar analyses of the thermodynamic field in the inflow layer were conducted Diagnostic budget analyses of moisture, sensible heat kinetic energy and momentum in the inflow layer were conducted Air-sea interactions were also examined B W

N85-23820*# Kansas Univ Center for Research, Inc , Lawrence Remote Sensing Lab
LARGE SPACE ANTENNA TECHNOLOGY APPLIED TO RADAR-IMAGING, RAIN-RATE MEASUREMENTS, AND OCEAN WIND SENSING
R K MOORE and S P GOGINENI *In* NASA Langley Research Center Large Space Antenna Systems Technol , 1984 p 97-108 Apr 1985 refs
Avail NTIS HC A20/MF A01 CSCL 20N

During the last decade, the utility of spaceborne microwave remote sensing systems for ocean windspeed measurement, ocean wave imaging and sea ice studies was demonstrated Development of large space antennas offers some interesting possibilities for rain rate measurements, ocean and ice studies, and radar imaging The joint use of active and passive sensors using the 15 m antenna for ocean, ice, and soil moisture studies, rain rate measurements, and radar imaging is considered Verification of the frequency agile rain radar concept with Shuttle offers the possibility of much needed rain rate statistics over the ocean Author

N85-23874# Atmospheric Environment Service, Downsview (Ontario)
PROJECT PAPA: THE INTEGRATION OF DRIFTING BUOY DATA INTO AN OPERATIONAL METEOROLOGICAL SERVICE
D A BOURQUE *In* CNES Data Collection and Platform Location by Satellite 5 p 1980 refs
Avail NTIS HC A07/MF A01

The Canadian Atmospheric Environment Service (AES) deployed expendable drifting meteorological buoys in the North-East Pacific Ocean Because the data from the buoys are required in real-time a Local User Terminal (LUT) was developed to ingest, decode, identify, sort data, convert platform sensor data to engineering units, compute platform locations, encode the data into WMO DRIBU code messages and issue the messages on meteorological circuits, within an acceptable real-time frame The success of the LUT revealed potential expansions of the Canadian observational system into other remote areas, and forced the AES to adopt a non-AES-user policy Author (ESA)

N85-23875# Danish Meteorological Inst , Copenhagen
APPLICATIONS OF ARGOS DATA COLLECTION SYSTEMS IN ARCTIC REGIONS
F JENSEN *In* CNES Data Collection and Platform Location by Satellite 12 p 1980
Avail NTIS HC A07/MF A01

The Royal Danish Meteorological Institute agreed to maintain a minimum net of meteorological observations points in Greenland This obligation is partly fulfilled by automatic observation stations These stations are on remote locations and the most convenient method to communicate data is by METEOSAT and ARGOS data collecting systems In the most northern part of Greenland geostationary satellites decline below the horizon and only ARGOS can be used A ground station was established in Greenland to obtain real-time data from the ARGOS System Problems related to operating ARGOS platforms in the Arctic are discussed Author (ESA)

N85-23879# National Research Inst of Fisheries, Lisbon (Portugal)
AUTOMATIC BUOYS TO ASSIST THE TUNA FISHERY OFF THE AZORES
G L FIALHO and V R P BARROS *In* CNES Data Collection and Platform Location by Satellite 11 p 1980
Avail NTIS HC A07/MF A01

The sea surface temperature in the Azores tuna fishery was measured by airborne precision radiation thermometers and by stations every 15 days Calibration at sea of radiation thermometers in real time with data from buoys is described Surface temperature and the temperature of mixed layers are compared Mixed layer depth and its stability in the Azores are discussed Sea current speed and direction, and effects of weather conditions on sea surface temperature were studied Data reception delay was analyzed with telex and telephone data terminal experience Buoys,

beacons, transmitters and receivers are described Battery consumption of the buoys is presented as well as problems of transport, mooring and recovering buoys Author (ESA)

N85-23883# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE
1981 96 p refs Conf held in Bergen, 3-4 Mar 1981
Avail NTIS HC A05

The ARGOS system, ARGOS equipment, offshore data collection, ocean circulation, sea surface temperature mapping, iceberg drift, oceanographic uses of ARGOS, and meteorological uses of ARGOS are discussed

N85-23887# Continental Shelf Inst, Trondheim (Norway)
OPERATIONAL EXPERIENCES WITH THE ARGOS SYSTEM IN OCEANOGRAPHY AND OIL SPILL EMERGENCY PLANNING. FUTURE PLANS FOR THE USE OF THE ARGOS SYSTEM AS A COMPONENT IN OFFSHORE DATA COLLECTION SYSTEM
B A FOSSUM and T AUDUNSON *In* CNES Data Collection and Platform Location by Satellite 7 p 1981
Avail NTIS HC A05/MF A01

The need for and advantages of a satellite transmission system for positioning and ocean data acquisitions are sketched Author (ESA)

N85-23888# Kiel Univ (West Germany)
CIRCULATION PATTERN OF THE NORTH ATLANTIC, PART OF THE WARMWATER SPHERE RESEARCH EFFORT AT KIEL UNIVERSITY
W KRAUSS and J MEINCKE *In* CNES Data Collection and Platform Location by Satellite 10 p 1981 refs
Avail NTIS HC A05/MF A01

The North Atlantic current system is described About 30 Sv of the Gulf Stream waters recirculate south of the Grand Banks towards the Southwest The remaining 35 Sv follow the bottom topography towards NE It is expected that 10 Sv turn towards the Azores and the remaining 25 Sv form the North Atlantic Current As derived from hydrographic sections, this current should pass the North Atlantic Ridge near the Charly-Gibbs-Fracture Zone and should split into several branches east of the ridge The main branches are the Portugal Current, the Norwegian Current and the Irminger Current The ARGOS system could study the source area of the North Atlantic current and oceanwide features, but is too expensive Author (ESA)

N85-23891# Norwegian Meteorological Inst, Blindern
SOME EXPERIENCE FROM ARGOS STATIONS IN THE OPEN SEA
C K JENSEN *In* CNES Data Collection and Platform Location by Satellite 6 p 1981
Avail NTIS HC A05/MF A01

Buoy projects using the ARGOS system are summarized A meteorological buoy was anchored 200 nautical miles SW of Iceland Three free drifting First GARP Global Experiment (FGGE) buoys were deployed SW of Iceland Two free drifting FGGE buoys were deployed in the NE and NW Atlantic Three ships were equipped with ARGOS stations Author (ESA)

N85-23893# Danish Meteorological Inst, Copenhagen
APPLICATIONS OF ARGOS DATA COLLECTION SYSTEM FOR AUTOMATIC METEOROLOGICAL OBSERVATORIES IN ARCTIC REGIONS
F JENSEN *In* CNES Data Collection and Platform Location by Satellite 17 p 1981
Avail NTIS HC A05/MF A01

The Royal Danish Meteorological Institute agreed to maintain a minimum net of meteorological observations points in Greenland This obligation is partly fulfilled by automatic observing stations These stations are on remote locations and the most convenient method to communicate data is by Meteosat and ARGOS data collecting systems In the most northern part of Greenland geostationary satellites decline below the horizon and only ARGOS can be used A ground station was established in Greenland to obtain real-time data from the Argos System Problems related to operating ARGOS platforms in the Arctic are discussed Author (ESA)

N85-24350# Polar Research Lab, Inc, Santa Barbara, Calif
NEW DIRECTIONS IN ARGOS INSTRUMENTATION AT POLAR RESEARCH LAB (PRL)
W P BROWN and J ANDERSON *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 15 p 1981 refs
Avail NTIS HC A08/MF A01

A TIROS Arctic drifter for iceberg tracking and meteorological data, a buoy for water surface layer tracking, an iceberg tracker, mini ocean buoys, a thermistor string buoy for ocean current profiles, a conductivity buoy, a fishing boat tracker, an ARGOS/NAVSAT buoy for ice packs, an automatic weather station, and a polar bear tracker are described Author (ESA)

N85-24351# Bristol Aerospace, Ltd, Winnipeg (Manitoba)
FOURIER TRANSFORM OF WAVE DATA ON ARGOS BUOYS
W R WHITEHEAD *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 5 p 1981
Avail NTIS HC A08/MF A01

An ARGOS buoy which measures ocean waves and performs on-board analysis of the data before it is transmitted is described Data is collected for 30 min and processed to find the mean heave, largest wave, and average period Then a Fourier transform of the wave data is computed The processed data is recorded on cassette tape and transmitted, in summary form, via the ARGOS satellite Author (ESA)

N85-24354# Scripps Institution of Oceanography, La Jolla, Calif Inst of Oceanography
SURFACE CURRENTS IN THE TROPICAL PACIFIC DURING 1979-1980 USING DRIFTING BUOYS
W PATZERT and G J MCNALLY *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 5 p 1981 refs
Avail NTIS HC A08/MF A01

Results from the 60 satellite-tracked drifting buoys deployed in the NORPAX Hawaii/Tahiti Shuttle Experiment are discussed Although the primary objective of this project was to describe the variations of the near surface flow in the North Equatorial Countercurrent (NECC) and Current (NEC) on seasonal and shorter time scales, buoys were also deployed in the equatorial waveguide, i e, 3N to 3S The NECC exhibits strong annual variations in zonal flow, NECC meandering is present during most of the year, the NEC is steadiest and strongest between 9 and 12N All buoy trajectories reveal inertial motions with amplitudes of + or - 20 cm/sec, the same amplitude as the mesoscale and annual signals Author (ESA)

N85-24356# Beak Consultants Ltd, Richmond (British Columbia)
INFERENCES OF FUTURE OPERATIONS DRAWN FROM PAST AND PRESENT APPLICATIONS OF DRIFTING BUOYS
N E J BOSTON *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 5 p 1981 refs
Avail NTIS HC A08/MF A01

In the subarctic North Pacific, drifting buoys are investigated as a mean of replacing the data gathering capabilities of ocean weather station P (or ship PAPA) In the eastern Arctic, drifting buoys provide current data in the ice and iceberg infested waters of Davis Strait The intergovernmental oceanographic commission, and the World Meteorological Organization, are investigating meteorological and oceanographic applications of drifting buoys which may provide products to incorporate into Integrated Global Ocean Station System Local studies are responses to immediate needs and tend to be industry oriented and supported Regional studies are related to national interests (weather, fisheries) and are sponsored by national governments Global studies have

applied and basic research applications which require international support A center which assists in operations, is a clearing house of information, coordinates studies, and disseminates data is seen as the next development in drifting buoy technology
Author (ESA)

N85-24358# National Oceanic and Atmospheric Administration, Bay St Louis, Miss. Data Buoy Office
US PROGRAM IN ANCHORED DATA BUOY AND THE OTHER FIXED OBSERVATION PLATFORMS
J C MCCALL *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 11 p 1981
Avail NTIS HC A08/MF A01

The NOAA Data Buoy Office (NOBO) develops and operates moored buoys in all U S coastal and offshore waters from New England to Hawaii (including the Great Lakes) to provide real-time environmental measurements in data-sparse areas for the National Weather Service and other public and private users The NOBO also has a program for development, deployment, and operation of drifting buoys, which provide environmental measurements in the South Atlantic and Pacific from Chili to Australia and in the Northern Hemisphere In addition, NOBO develops, deploys, and operates special purpose environmental measuring systems for other government agencies, particularly for petroleum-related purposes, and has an engineering development effort in procuring new and improved sensor and communications systems
Author (ESA)

N85-24359# National Research Inst for Oceanology, Stellenbosch (South Africa)
ONE THOUSAND DAYS IN THE BRINE
C C STAVROPOULOS and P A LEROUX (South African Weather Bureau, Pretoria) *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 11 p 1981
Avail NTIS HC A08/MF A01

Twenty-three satellite tracked ARGOS drifting buoys were deployed in the Southern Ocean The buoys continue working for 1000 days, with no instrument problems or broadcasting failures, but a high loss rate due to bad handling and electronics deficiencies is reported The contribution of one buoy to meteorological data acquisition in the southern hemisphere is outlined Author (ESA)

N85-24362# Department of Environment, Ottawa (Ontario) Atmospheric Environment Services
THE DEVELOPMENT OF AN AUTOMATED MARINE METEOROLOGICAL DATA SYSTEM
R VOCKEROTH *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 8 p 1981
Avail NTIS HC A08/MF A01

A real-time meteorological data buoy system using FGGE-type drifting buoys and an ARGOS local user terminal were developed Expansion of the system to include anemometer buoys and shipboard automatic platforms is discussed Projected operating costs are given
Author (ESA)

N85-24364# National Marine Fisheries Service, La Jolla, Calif Southwest Fisheries Center
TRACKING PELAGIC DOLPHINS BY SATELLITE
J G JENNINGS and R K STIVES *In* CNES Proc of the ARGOS Users Conf on Data Colection and Platform 6 p 1981 refs
Avail NTIS HC A08/MF A01

Two dolphins fitted with transmitter packs were tracked by plane and satellite for 1 week The plane was equipped with a receiver similar to that onboard the satellite, but modified to serve as an automatic direction finder Ground truth was collected from the plane during the orbits The transmitter pack prototype weighed 907 gm and was packaged in 2 cylinders, measuring 17 5 x 5 cm To conserve batteries, the units were clocked on daily for 4 hr, corresponding to the best satellite orbits The 1 W antenna was mounted on a pedestal Satellite position determinations are 2 to 10 km from actual locations. The packs must be reduced in diameter for longterm application to pelagic dolphins
Author (ESA)

N85-24366# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE
1982 196 p refs Partly in FRENCH and ENGLISH Conf held at Paris, 20-22 Apr 1982
Avail NTIS HC A09

Use of the ARGOS satellite data collection and platform location system in oceanography, meteorology, biology, and hydrology was discussed Maritime applications and ARGOS equipment were described

N85-24367# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
THE ARGOS SYSTEM MAIN CHARACTERISTICS
J L BESSIS *In its* Data Collection and Platform Location by Satellite ARGOS Users' Conf p 1-10 1982 In FRENCH, ENGLISH summary
Avail NTIS HC A09/MF A01

The ARGOS satellite based localization system is described The user platform weighs only 2 kg, so can be carried by a wide range of targets, e g , balloons, icebergs, or animals The platforms are linked to NOAA satellites, which act as relay stations for platform and satellite environmental and experiment data Special ground stations were built for direct data collection The localization system is based on Doppler positioning, with 60% of platforms located at each satellite passage Accuracy is within 100 m The data processing system assures 99% availability of data, 66% of the data are available 3 hr after measurement, 87 5% 6 hr Information includes raw and converted sensor data, and position, speed, and last localization date of platforms Real time data transmission is assured by the Global Telecommunication System Projects include meteorology, oceanography, and glaciology
Author (ESA)

N85-24368# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
THE ARGOS SYSTEM AFTER 3 YEARS OPERATION
M TAILLADE *In its* Data Collection and Platform Location by Satellite ARGOS Users' Conf p 11-23 1982 In FRENCH, ENGLISH summary
Avail NTIS HC A09/MF A01

The ARGOS data collection and platform location contribution to the NOAA-TIROS program is reviewed Of 100 platforms seen during each orbit, 60 are correctly located Average location accuracy is 500 m Environmental data collection for atmospheric, oceanographic, and Earth sciences is increasing with each year of system operation Financial and promotional aspects of Service ARGOS are outlined
Author (ESA)

N85-24373# National Oceanic and Atmospheric Administration, Washington, D C Special Research Programs Office
A LARGE-SCALE AIR SEA INTERACTION PROJECT OVER THE PACIFIC BASIN
R J FLEMING *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 67-84 1982 refs
Avail NTIS HC A09/MF A01

A study of relations between the Southern Oscillation, El Nino, and the Walker Circulation and atmospheric changes is discussed A 10 yr Basin Monitoring Activity includes measuring the wind field, surface heat and moisture fluxes, sea level, and the thermal structure in the upper ocean Specific observations of these parameters will build upon existing observing programs However, much of the Pacific is not adequately observed in the ocean or the atmosphere and an array of buoys will be deployed to fill the most critical data-void areas
Author (ESA)

N85-24374# Direction de la Meteorologie Nationale, Magny les Hameaux (France) Etablissement d'Etudes et de Recherches Meteorologiques

METEOROLOGICAL BUOYS DEVELOPED AT THE EERM LABORATORY

V KLAUS *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 85-99 1982 refs In FRENCH, ENGLISH summary

Avail NTIS HC A09/MF A01

Moored and drifting meteorological buoys were developed The Marisonde B drift buoy transmits atmospheric pressure and sea surface temperature data via the ARGOS system The Navisonde fast drifting buoy measures pressure, sea surface temperature, and wind speed The Marisonde G is bigger than the others, collecting air temperature and wind direction in addition to the previous parameters The Marisonde RC is a moored automatic weather station for synoptic meteorology The Marisonde H is a wave buoy, giving height and mean period in real time

Author (ESA)

N85-24376# Rijkswaterstaat, The Hague (Netherlands) Data Processing Div

THE ARGOS COMMUNICATIONS PERFORMANCE TRIALS

J LOOYEN *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 113-123 1982

Avail NTIS HC A09/MF A01

The ability of the ARGOS system to satisfy user requirements on data communication links for coastal and seaborne meteorological and hydrological buoys was assessed The telemetry systems were designed for real time operation, imposing extra constraints on transmission delay times Results show that ARGOS time delays exclude its use in a real time network The time between passes creates gaps in data transmission However, ARGOS is highly reliable, with good documentation and service, and the transmission ratio is good Author (ESA)

N85-24381# National Museum of Natural History, Paris (France) Lab d'Oceanography Physique

THE ARGOS CONTRIBUTION TO THE SUCCESSFUL DREDGING OF A DEEP MOORED CURRENT METER

J GONELLA and B OLLIVIER (ORSTOM) *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 159-164 1982 In FRENCH, ENGLISH summary

Avail NTIS HC A09/MF A01

Current meters moored at 1200 m from a seabed 4600 m deep in the Indian Ocean were recovered using the ARGOS system after failure of the explosive anchor-release bolts prevented recovery using acoustic methods The position of each mooring was known to within 0 25 nautical miles, so the ARGOS system was used to position the recovery ships to within 100 m of the targets Author (ESA)

N85-24391# Centre National d'Etudes Spatiales, Toulouse (France)

DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE

1982 225 p refs Conf held at Annapolis, 13-15 Dec 1982

Avail NTIS HC A10/MF A01

Use of the ARGOS satellite data collection and platform location system in oceanography, meteorology, biology, and hydrology was discussed Maritime applications and ARGOS equipment were described

N85-24396# National Data Buoy Center, Bay Saint Louis, Miss

DRIFTING BUOY STUDIES FOR WEATHER APPLICATIONS

E G KERUT *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 20 p 1982

Avail NTIS HC A10/MF A01

Drifting buoys deployed in the Southern Hemisphere for the Global Weather Experiment improved weather analyses and forecasts dramatically Buoys deployed in the Storm Transfer and Response Scientific Experiment (STREX) did not improve weather analyses and forecasts to the degree of the data from buoys in the Southern Hemisphere The STREX array was limited with small spacing, and consequently could improve analyses only over a rather limited area A larger, more widely dispersed array in the Pacific would be more effective for weather operations Many of the buoys reported unreliable data, therefore reducing the number of useful data buoys from 24 to 12 This, however, is a minor consequence because of the dense array spacing The overall experimental results are sufficiently encouraging to propose operational drifting buoy programs for North American continent weather activities Author (ESA)

N85-24398# Atmospheric Environment Service, Toronto (Ontario)

COLLECTING METEOROLOGICAL REPORTS WITH THE ARGOS SYSTEM

R VOCKEROTH and C DICENZO *In* CNES Data Collection and Platform Location by Satellite ARGOS User's Conf 12 p 1982 refs

Avail NTIS HC A10/MF A01

The Canadian Atmospheric Environment Service undertook to use FGGE type drifting buoys and the ARGOS data collection system on the NOAA satellites to reduce gaps in the coverage of surface data obtained from voluntary observing ships and moored buoys To obtain the buoy data in real-time for meteorological analysis an ARGOS Local User Terminal (LUT) capability was developed by adding decoding and location computation facilities to the S-band High Resolution Picture Transmission weather satellite receiving station Experience in using the LUT, and the proposed operation of several such stations around the North Atlantic are discussed Author (ESA)

N85-24399# Centre National pour l'Exploitation des Oceans, Paris (France)

THE FRENCH OCEAN CLIMATE IN EQUATORIAL ATLANTIC (FOCAL) DRIFTER PROGRAM, 1983-1984

J GONELLA, M FIEUX, A KARTAVTSEFF, G REVERDIN, C COLIN (ORSTOM), and Y DUPENHOAT (ORSTOM) *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 11 p 1982 refs Sponsored by Centre National pour l'Exploitation des Oceans and French Programme National pour l'Etude du Climat

Avail NTIS HC A10/MF A01

The French Ocean Climate in Equatorial Atlantic (FOCAL) experiment to study the response of the upper equatorial Atlantic Ocean to atmospheric forcing, the seasonal cycle of the depth of the thermocline, and surface currents in the intertropical zone is outlined The FOCAL drifting buoys are equipped with thermistor chains and transmit the resulting data by the ARGOS system The impact of the buoys on the FOCAL and Seasonal Equatorial Atlantic Experiment experimental array was studied in objective analysis simulations, where buoys followed a climatological surface flow, which included the mean seasonal cycle Results indicate that drifting buoys released in the Eastern Equatorial Atlantic can make a significant contribution in understanding the response of the upper ocean To achive the required accuracies, at least 20 buoys are needed Author (ESA)

N85-24400# Rhode Island Univ , Kingston Graduate School of Oceanography

THE DEEP DRIFTER PROGRAM

T ROSSBY and D DORSON *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 25 p 1982 refs

(Contract NSF OCE-80-10839)

Avail NTIS HC A10/MF A01

An instrument for studies of subsurface and deep ocean currents which employs the ARGOS system to determine the pop-up point of the drifter at the end of its mission is described The instrument is 2 m long and weighs 12 kg The entire electronics package including the quad-helix antenna fits inside a standard 7 5 cm ID glass pipe, which provides the flotation In situ pressure and temperature information is collected with a CMOS microprocessor for later broadcast to ARGOS at the surface The RF link at the

surface is very reliable, even in heavy weather 50% of the transmissions are received correctly Two subsurface tests were conducted successfully in the Gulf Stream 7 days at 400 m and 5 days at 1700 m Author (ESA)

N85-24401# National Oceanic and Atmospheric Administration, Rockville, Md
US PROGRAMS USING THE ARGOS DATA COLLECTION AND PLATFORM LOCATION SYSTEM
T E BRYAN *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 10 p 1982
Avail NTIS HC A10/MF A01

Drifting buoy, constant level balloon, and moored, shipboard and animal tracking system experiments carried out by NOAA, the US Coast Guard, the Office of Naval Research, and the National Science Foundation using the ARGOS data collection and platform location system are summarized The experiments cover oceanographic, meteorological, pollution monitoring, Arctic region, and atmospheric studies Author (ESA)

N85-24402# Woods Hole Oceanographic Institution, Mass
TELEMETERED METEOROLOGICAL AND ENGINEERING DATA FROM A DEEP SEA MOORED BODY IN THE LONG TERM UPPER OCEAN STUDY (LOTUS)
C DESER *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 20 p 1982 refs
Avail NTIS HC A10/MF A01

The Long Term Upper Ocean study (LOTUS) experiment was designed to examine weekly, monthly and seasonal variability in air-sea interaction processes at a site in the Sargossa sea The experiment employs a moored buoy as a platform for meteorological and oceanographic instrumentation Engineering data, such as tension of the mooring line and battery voltage, and meteorological data are telemetered via the ARGOS satellite system The ARGOS system provides buoy position and a precise timeword The telemetered data are used for monitoring the meteorological conditions at the LOTUS site Instrument performance is also checked If the mooring line fails as it did during a prior engineering deployment, the buoy can be tracked using the ARGOS system Author (ESA)

N85-24403# Oregon State Univ, Newport Marine Science Center
TRACKING WHALE MIGRATIONS WITH THE ARGOS SATELLITE SYSTEM
B R MATE and J T HARVEY *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 15 p 1982 refs
Avail NTIS HC A10/MF A01

The surfacing frequency of 10 radio tagged gray whales was analyzed to determine the feasibility of locating this species throughout its migratory range using the ARGOS satellite system A frequency distribution of the time necessary to complete 6 sequential surfacings at least 43 sec apart was used as a predictive model to estimate the probability of 6 qualified whale surfacings occurring for a satellite pass of any duration Results suggest that whales tagged with an ARGOS beacon would be monitored at least 75 min per day, with 2 daily location determinations predicted under ideal conditions at the southernmost part of their range In the northern range, the predicted performance more than doubles Author (ESA)

N85-24405# Partech Electronics Ltd, St Austell (England)
PRACTICAL CONSIDERATIONS WHEN USING WATER QUALITY AND STRUCTURE MONITORING SENSORS AS APPLIED TO PORTABLE ARGOS SATELLITE TRANSMITTER EQUIPMENT
A. R PARKER *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 7 p 1982
Avail NTIS HC A10/MF A01

Design criteria for low cost ARGOS transmitter equipment are proposed The transmitter packages should be able to withstand extreme weather conditions, house all sizes of ARGOS platform transmitter terminals, incorporate more equipment at a later date, and use car batteries Water quality sensors should be maintenance-free long term devices, with minimal effects of marine growth Packages should be of an open pattern to make them less attractive to marine life Full load-bearing marine quality cables must be used Power consumption of electromagnetic sensors should be minimized by using time switches to optimize warm-up prior to transmission Author (ESA)

N85-24406# Toyo Communication Equipment Co Ltd, Kawasaki (Japan) Mobile Radio Communication Div
DRIFTING BUOY DEVELOPMENT AND FUTURE PROGRAMS
M TSUTSUMI *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 9 p 1982
Avail NTIS HC A10/MF A01

A drifting buoy for the Kuroshio Current (Japan) survey, a drifting buoy for deep sea temperature measurement, and an ARGOS platform terminal transmitter for tracking dolphins are described Author (ESA)

N85-24408# Hermes Electronics Ltd, Dartmouth (Nova Scotia)
DEVELOPMENT OF A LOW COST DRIFTING BUOY
F GUPTILL and B THOMPSON (Petro Canada) *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 20 p 1982 refs Sponsored by Canadian government
Avail. NTIS HC A10/MF A01

A buoy that costs up to one-third less than comparable buoys was developed It can be deployed from either a helicopter or light plane if required, and is one-fifth the weight of a conventional drogued buoy It can be launched by one person requiring only minimum instructions and no special equipment It can be transported in one-fifth the volume of the conventional equivalent Drogue and tether fittings were pull-tested to destruction (at or above 18000 Nt) This gives a safety factor of 50 under computer simulated conditions The hull was leak-tested in a full-up configuration in water to a depth of 8 m The electronics payload was subjected to mil-spec vibration testing and temperature cycling down to -40C Author (ESA)

N85-24409# Centre National d'Etudes Spatiales, Toulouse (France)
DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE
1984 313 p refs Conf held in Seattle, 21-23 May 1984, sponsored by NOAA, CNES and NASA
Avail NTIS HC A14/MF A01

Use of the ARGOS satellite data collection and platform location system in oceanography, meteorology, and biology was discussed Maritime applications and ARGOS equipment were described

N85-24410# National Oceanic and Atmospheric Administration, Rockville, Md
US PROGRAM USING THE ARGOS DATA COLLECTION AND PLATFORM LOCATION SYSTEM
T E BYRAN *In* CNES Data Collection and Platform Location by Satellite 10 p 1984
Avail NTIS HC A14/MF A01

Drifting buoy, constant level balloon, and moored, shipboard and animal tracking system experiments carried out by NOAA, the US Coast Guard, the Office of Naval Research, and the National Science Foundation using the ARGOS data collection and platform location system are summarized The experiments cover oceanographic, meteorological, pollution monitoring, Arctic region, and atmospheric studies Author (ESA)

N85-24411# National Oceanic and Atmospheric Administration, Rockville, Md Office of Climatic and Atmospheric Research
THE TROPICAL OCEAN AND GLOBAL ATMOSPHERE PROGRAM (TOGA)
J M HALL *In* CNES Data Collection and Platform Location by Satellite 35 p 1984 refs
Avail NTIS HC A14/MF A01

The Tropical Ocean and Global Atmosphere program was designed to investigate seasonal and interannual global climatic variations and to develop techniques for predicting them Evidence suggests that the most pronounced air/sea interactions affecting climate on these time scales occur in the tropics in association with a systematic large-scale atmospheric pressure fluctuation called the Southern Oscillation Accompanying these pressure variations are significant changes in tropical and subtropical atmospheric circulation patterns, major shifts in the position of the jet stream, departures in the rainfall patterns in the monsoon regions and the Pacific Basin, and remarkable changes in the equatorial current system and the heat content of the tropical Pacific The 10 gr program includes a 2 yr intensive monitoring of El Nino Author (ESA)

N85-24412# National Data Buoy Center, Bay Saint Louis, Miss
ARABIAN GULF CIRCULATION
R L PICKETT (Naval Ocean Research and Development Activity), R M PARTRIDGE, J A GALT (NOAA, Seattle), and R A ARNONE (Naval Ocean Research and Development Activity) *In* CNES Data Collection and Platform Location by Satellite 18 p 1984 refs
Avail NTIS HC A14/MF A01

To help forecast oil spill movements, seven satellite-tracked drifting data buoys were launched in the Arabian Gulf Their month-long paths were compared to historical data and to a hydrodynamic model Results show a generally counterclockwise circulation with observed speeds off Saudi Arabia of 20 cm/sec Author (ESA)

N85-24413# National Center for Atmospheric Research, Boulder, Colo
A REPORT ON THE DRIFTERS PROGRAM
R HEINMILLER (OMNET), J MASTERSON, and J MCWILLIAMS *In* CNES Data Collection and Platform Location by Satellite 10 p 1984 refs
Avail NTIS HC A14/MF A01

A plan for the development and utilization of ocean drifting buoys is presented The evolution of drifting buoys and status of the drifters program are discussed A projection of the use of drifting buoys for scientific investigations is outlined An inexpensive, calibrated Lagrangian drifter, and a modularly configurable, surface flux (i e , momentum, surface and latent heat, and precipitation), and upper ocean temperature and current (i e , relative flow) drifter compatible with ARGOS were built Author (ESA)

N85-24414# National Oceanic and Atmospheric Administration, Seattle, Wash Pacific Marine Environmental Lab
APPLICATIONS OF ARGOS MEASUREMENTS IN EQUATORIAL PACIFIC OCEAN-ATMOSPHERE INTERACTION STUDIES
H P FREITAG, D HALPERN, and A SHEPHERD *In* CNES Data Collection and Platform Location by Satellite 13 p 1984 refs Sponsored by NOAA
Avail NTIS HC A14/MF A01

The Equatorial Pacific Ocean Climate Studies (EPOCS) program investigation of processes which generate, maintain, and dissipate the large-scale interannual sea surface temperature (SST) variations centered along the equator in the eastern and central Pacific is introduced Because the velocity field within 1 to 2 deg of the equator is not geostrophic, moored current measurements are required in the upper ocean to unravel the complex dynamical processes (e g , Kelvin and Rossby waves, wind-generated mixing, zonal, meridional and vertical advection, undercurrent meandering, air-sea heat and moisture fluxes) influencing SST The ARGOS position and meteorological measurements used in EPOCS are described Author (ESA)

N85-24415# Petro-Canada Ltd , Calgary (Alberta)
DRIFTING BUOYS ON THE LABRADOR SHELF
J R BUCKLEY, W C THOMPSON, D B FISSEL (Arctic Sciences Ltd , Sidney, British Columbia), and J R BIRCH (Arctic Sciences Ltd , Sidney, British Columbia) *In* CNES Data Collection and Platform Location by Satellite 130 p 1984 refs Sponsored by Labrador Group of Companies
Avail NTIS HC A14/MF A01

Six ARGOS satellite-tracked drogued drifters and two moored buoys, which subsequently broke free from their moorings, deployed off Labrador provided near-surface current, air pressure and sea temperature data Near-surface currents are typically 30 to 50 cm/sec in the current core, and 20 cm/sec elsewhere Comparisons of the drifter velocity data with a data set of moored subsurface current measurements, obtained at depths of 52 to 102 m, shows that the near-surface velocities are on average twice the magnitude of those at depth However, the steadiness of the currents as indicated by the ratio of vector average velocity to mean speed is in good agreement for the two data sets A study of the internal consistency of air pressure data reveals significant differences among individual drifters However, using a median averaging technique, typical random uncertainties are 1 mbar Author (ESA)

N85-24416# Computer Sciences Corp , Bay St Louis, Miss
MOORED BUOY STATIONKEEPING AND LOCATION SYSTEM
R F GARRAND *In* CNES Data Collection and Platform Location by Satellite 16 p 1984 refs
(Contract NOAA-NA-80-QA-C-101)
Avail NTIS HC A14/MF A01

A reliable deep-ocean moored buoy stationkeeping and location system utilizing the Service ARGOS locating capability was made operational by the NOAA Data Buoy Center because of the need for an improved method with a faster response for detecting when buoys are adrift and for tracking and recovering an adrift buoy Watch circle radii and locations are calculated and then validated by plotting periodic and seasonal changes in the moored buoy locations Ongoing analyses are accomplished using computer plots generated from the buoy stationkeeping data base Correlations with LORAN-C data availabe from several buoys indicate negligible differences in mean calculated buoy locations Author (ESA)

N85-24417# Synergetics International, Inc , Boulder, Colo
A NEW VERSATILE ARGOS PTT FOR OCEANOGRAPHIC APPLICATIONS
R C ROARK, P F SMITH (Ferranti O R E , Inc , Falmouth, Mass), and D E FRYE (Ferranti O R E , Inc , Falmouth, Mass) *In* CNES Data Collection and Platform Location by Satellite 12 p 1984 refs
Avail NTIS HC A14/MF A01

An ARGOS platform electronics system based on technology of 400 MHz GOES synthesized transmitters was developed The electronic subsystem is flexible enough to interface to a variety of oceanographic/meteorological sensors, with a cost/performance ratio suitable for cost sensitive applications Flexibility is achieved through the use of optional on board integrated circuits to provide analog and event counter inputs Without any optional sensor interface circuits, the platform accepts 5V ASCII serial data into the transmission buffer asynchronously, and transmits this data to the polar orbiting ARGOS satellite The required ARGOS System protection from malfunctioning is provided, and all standard transmission repetition rates and message data lengths are supported Platform ID and all the setup parameters can be set by switches, jumpers, via the serial data interface, or directly from the CMOS EPROM Author (ESA)

N85-24418# Atmospheric Environment Service, Downsview (Ontario)
OVERVIEW OF DATA PROCESSING AT AES LOCAL USER TERMINALS
W HUME and H KAGAWA *In* CNES Data Collection and Platform Location by Satellite 6 p 1984
Avail NTIS HC A14/MF A01

The Canadian Atmospheric Environment Service undertook a multiyear program designed to offset the loss of weather data from weatherships at Ocean Station P in the northeast Pacific The program includes the development and maintenance of a network of drifting buoys in the northeast Pacific, and the installation of an ARGOS Direct Readout Station, and a GOES VISSER readout station Expansion of the buoy and computing systems is discussed The status of the Pacific, Atlantic, Arctic, and Hudson Bay projects is summarized Author (ESA)

N85-24421# Oregon State Univ, Newport Marine Science Center
THE ARGOS SYSTEM USED FOR TRACKING GRAY WHALES
B R MATE *In* CNES Data Collection and Platform Location by Satellite 6 p 1984 refs
Avail NTIS HC A14/MF A01

The development of satellite whale tags used to track gray whales in the eastern north Pacific Ocean is summarized Two gray whales were radio-tagged in San Ignacio Lagoon (Mexico) and tracked on their northbound migration One of the transmitters was modified to record and relay depth-of-dive information at 15 sec intervals throughout the course of the dive Technical elements of data acquisition and analysis are outlined The major biological findings are discussed Author (ESA)

N85-24422# National Data Buoy Center, Bay Saint Louis, Miss
AN OVERVIEW OF NDBC DRIFTING BUOY DEVELOPMENT PROGRAMS
R KOZAK and J ANDERSON (Polar Research Laboratory, Inc) *In* CNES Data Collection and Platform Location by Satellite 11 p ARGOS Users' Conf., 21-23 May 1984 11 p 1984
Avail NTIS HC A14/MF A01

Three drifting buoy development programs are described The first is a drifter capable of measuring subsurface water temperature to a depth of 600 m using a multiplexer network which allows for increased reliability and reduced thermistor cable size and weight This system uses ARGOS data for the reporting of diagnostic information to identify failure modes The second program is the development of an operational sensor system for obtaining reliable wind direction measurements from drifting buoys The third program addresses the design and development of a drifting buoy used to obtain hurricane information prior to landfall Author (ESA)

N85-24510*# National Aeronautics and Space Administration Wallops Flight Center, Wallops Island, Va
REMOTE SENSING OF DIRECTIONAL WAVE SPECTRA USING THE SURFACE CONTOUR RADAR
E J WALSH, D W HANCOCK, III, D E HINES, and J E KENNEY (NRL) 1985 4 p refs
(NASA-TM-84440, NAS 1 15.84440) Avail NTIS HC A02/MF A01 CSCL 08B

A unique radio-oceanographic remote sensing instrument was developed The 36 GHz airborne Surface Contour Radar (SCR) remotely produces a real-time topographical map of the sea surface beneath the aircraft It can routinely produce ocean directional wave spectra with off-line data processing The transmitter is a coherent dual-frequency device that uses pulse compression to compensate for the limited available power at Ka band The radar has selectable pulse widths of 1, 2, 4, and 10 nanoseconds The transmitting antenna is a 58 lambda horn fed dielectric lens whose axis is parallel to the longitudinal axis of the aircraft. It illuminates an elliptical mirror which is oriented 45 deg to the lens' longitudinal axis to deflect the beam towards the region beneath the aircraft. The mirror is oscillated in a sinusoidal fashion through mechanical linkages driven to a variable speed motor to scan the transmitter beam (1 2 deg X 1 2 deg) with + or - 16 deg of the perpendicular to the aircraft wings in the plane perpendicular to the aircraft flight direction B W

N85-24511# Naval Ocean Research and Development Activity, Bay St Louis, Miss
DIGITAL PROCESSING OF PASSIVE KA-BAND MICROWAVE IMAGES FOR SEA-ICE CLASSIFICATION Final Report
D T EPPLER, L D FARMER, A W LOHANICK, and M HOOVER May 1984 62 p Original contains color illustrations (AD-A150686, NORDA-51) Avail NTIS HC A04/MF A01
CSCL 14E

The primary objective of NORDA's Ka-band Radiometric Mapping System (KRMS) program is to provide basic research needed for Navy development of an operational imaging system that can produce detailed information concerning ice conditions over broad regions of the Arctic To this end, methods suitable for automated identification and classification of sea ice types and open water are being developed An experimental plan has been formulated that will lead to an automated system that will provide real-time ice classification information onboard Navy aircraft This report represents completion of the initial state of this plan During March 1983 extensive high-quality KRMS imagery and coincident high-resolution photography were obtained of ice in the Beaufort Sea Analysis of these data suggests that four classes of winter surfaces can be distinguished solely on the basis on Ka-band brightness temperature open water, frazil, old ice, and young/first year ice New ice (excluding frazil) and nilas display brightness temperatures that overlap the range of temperatures characteristic of old ice and young/first year ice Scenes in which new ice or nilas are present in appreciable amounts are subject to substantial errors in classification Textural characteristics of nilas and new ice, however, differ significantly from textural features characteristic of other ice types and probably can be used with brightness temperature data to classify single-band microwave images GRA

N85-25354# Joint Publications Research Service, Arlington, Va
ANALYSIS OF HYDROMETEOROLOGICAL CONDITIONS IN ANTARCTIC COASTAL WATERS ACCORDING TO DATA FROM HYDROLOGICAL AND SATELLITE OBSERVATIONS Abstract Only
V V GOLOSOV and O A REBENKOVA *In its* USSR Rept Space (JPRS-USP-85-003) p 118 4 Mar 1985 Transl into ENGLISH from Vestnik Leningradskogo Univ Geol, Geografiya (USSR), no 3, Sep 1984 p 96-99
Avail NTIS HC A08/MF A01

A hydrometeorological description of the coastal region of Antarctica is presented based on hydrological data obtained during the summer navigation season of 1980/1981, together with TV images of the Indian Ocean and Atlantic Ocean sectors of the Antarctic Ocean A monthly generalization of cloud cover conditions in the coastal area 0 to 40 deg, is given to detect the hydrological front in this region, to trace the destruction of the zone of drifting coastal ice in January and the appearance of young ice in early March, and to evaluate the nature of water circulation on the basis of movement of a gigantic iceberg It is found that there is a predominance of cloudless or nearly cloudless weather during the summer season The TV photographs for the southwestern part of the Riiser-Larsen Sea identified the position of the hydrological front The front separates cold coastal and heated waters in the central part and persists stably at 15 deg E for at least a month In summer, drifting ice advances into this region from the east, making navigation more difficult Mapping of the trajectory of movement of an enormous iceberg in February-March 1981 confirms the pattern of circulation determined from hydrological observations E A K

N85-26047*# National Aeronautics and Space Administration, Washington, D C
SPACE METHODS IN OCEANOLOGY
A A BOLSHAKOV Mar 1985 47 p refs Transl into ENGLISH of the book "Kosmicheskiye Metody v Okeanologii, No 6" Moscow, Znaniye, 1982 p 1-58, 64 Transl by The Corporate Word, Pittsburgh
(Contract NASW-4006)
(NASA-TM-77652, NAS 1 15 77652) Avail NTIS HC A03/MF A01 CSCL 08J

The study of Earth from space with specialized satellites, and from manned orbiting stations, has become important in the space programs The broad complex of methods used for probing Earth from space are different methods of the study of ocean, dynamics The different methods of ocean observation are described
E A K

N85-27331# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
DIFFUSION COEFFICIENTS FOR COASTAL WATER DETERMINED FROM AERIAL PHOTOGRAPHS
M R STEVENSON and H M INOSTROZAV Feb 1985 11 p refs Presented at the 4th Reuniao da SELPER, Santiago de Chile, 12-16 Nov 1984
(INPE-3413-PRE/679) Avail NTIS HC A02/MF A01

The horizontal coefficient of mixing (diffusion coefficient) in the ocean is necessary for a large variety of coastal and marine environmental studies Two coastal embayments along the southeastern coast of Brazil were studied Rhodamine-B dye was dissolved in methanol and the solution was separated into three aliquots, each containing about 100 gm of dye During the experiment, an aircraft flew over the area and took a number of photographs with an RC-10 metric camera From the film images it was possible to extract information on the areal changes of each dye patch The data were used to construct dispersion diagrams Using a least squares method, the diffusion coefficients for three dispersals were determined The largest value corresponded to a bay more exposed to the sea, than the other two locations The values, derived from aerial photographs, compared very well with previous determinations of K, based on conventional fluorometric methodology in a nearby area It is suggested that it is possible to obtain reasonable estimates of diffusion from aerial photographs
E A K

N85-27333# Centre National d'Etudes Spatiales, Toulouse (France)
DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE
1983 364 p refs Partly in ENGLISH and FRENCH Conf held at London, 27-28 Sep 1983
Avail NTIS HC A16/MF A01

Use of the ARGOS satellite data collection and platform location system in oceanography, meteorology, biology, seismology and hydrology was discussed Maritime applications and ARGOS equipment were described

N85-27337# Thorn EMI, Hayes (England) Sheer Water Working Dept
DB2 AND DB3: THE NEXT GENERATION
P A. BEDFORD *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 6 p 1983 refs
Avail NTIS HC A16/MF A01

The application of satellite telemetry to the DB2 and 3 oceanographic/meteorological buoy project is described The buoys acquire data for real time transmission and on-board recording Each buoy has two duplicated and independant data processing packages on-board and each transmits to the ARGOS and METEOSAT Systems The advantage of this highly redundant arrangement is the low probability of total data loss Meteorological parameters are disseminated via the Global Telecommunication System to the UK Meteorological Office to be used as a data source for weather forecasting Transmitted data are recorded at ARGOS and METEOSAT ground stations, these data are merged with that of the on-board recorders to produce the best possible data set
Author (ESA)

N85-27338# National Oceanic and Atmospheric Administration, Bay St Louis, Miss
DEVELOPMENT OF A LAGRANGIAN DRIFTING BUOY
E G KERUT and W B WILSON *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 7 p 1983 refs
Avail NTIS HC A16/MF A01

The development of a well-calibrated Lagrangian drifting buoy system to measure surface currents in climate-related experiments in ocean basins to obtain a statistical description of surface ocean current dynamics is described The development approach was based on a hull design to minimize the deleterious effects of wind and waves on a Lagrangian current tracker Theoretical studies indicated a spheroid hull shape to have a high potential as a surface Lagrangian tracking device A numerical computer model to simulate generic spheroid hull forms in a synthesized environment for Lagrangian effectiveness studies was developed and validated in laboratory tests for implementing preliminary system design studies These studies were performed and recommendations for the design of a prototype Lagrangian drifting buoy system were made
Author (ESA)

N85-27339# Laboratoire de Meteorologie Dynamique du CNRS, Palaiseau (France)
LONG TERM DRIFTING FLOAT FOR MEASURING MEAN OCEANIC CIRCULATION USING ARGOS SYSTEM
J C GASCARD (Laboratoire d'Oceanographie Physique), P F JEANNIN (Laboratoire d'Oceanographie Physique), and H OVARLEZ *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 10 p 1983
Avail NTIS HC A16/MF A01

An expendable, 3 yr lifetime, glass float located via ARGOS was developed for ocean current mapping The reliability of surface transmissions via TIROS-N satellite for location and for message reception was tested Three floats were launched Two were washed ashore after 1 week The third remained offshore and lasted for 38 days This float was located 8 times every day on average, with an accuracy of 800 m Fifteen messages were transmitted on average for each passage, lasting 10 min, with the float emitting every 40 sec On average 12 messages are absolutely correct among the 15 Within the 32 bytes of the message, an error rate increasing from 1% on the first bytes collected to 3% or 4% on the last ones is found
Author (ESA)

N85-27340# Scottish Marine Biological Association, Edinburgh (Scotland) Marine Physics Dept
ARGOS-TRACKED DRIFTERS IN THE ROCKALL TROUGH
D J MELDRUM, D BOOTH, and D RITCHIE *In* CNES Data Collection and Platform Location by Satellite: ARGOS Users' Conf 14 p 1983 refs
Avail NTIS HC A16/MF A01

A small, freely drifting satellite-tracked low-drag buoy, drogue and rigging system was designed, and was deployed in the Rockall Trough area of the Atlantic, known to possess a considerable thickness of possibly hydrocarbon-bearing sediments The buoys are used to study horizontal surface current structure A large anticyclonic gyre is detected
Author (ESA)

N85-27341# Christian Michelsens Institutt for Videnskap og Andsfrihet, Bergen (Norway)
MONITORING OF MARINE ENVIRONMENT
N S NERGAARD *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 13 p 1983
Avail NTIS HC A16/MF A01

Marine environmental monitoring buoys are described A drifting buoy with an ARGOS transmitter was deployed in the Southern Ocean and on Antarctic icebergs A cement drifter was used for oil pollution simulations A wave following moored buoy was developed An iceberg monitoring capsule which can be deployed by parachute was built
Author (ESA)

N85-27343# Centre National pour l'Exploitation des Oceans, Paris (France) Dept d'Etudes Oceaniques
WAVE DIRECTIONAL SPECTRA VIA ARGOS
D BECQ *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 12 p 1983 refs
Avail NTIS HC A16/MF A01

A wave directional, satellite system buoy transmitting data via a radio link, enabling a detailed characterization of the sea was developed A powerful microprocessor for computation and two low consumption ones monitoring the powerful one solve the autonomy problem The use of two successives ARGOS messages for transmission of a complete and usable B spectrum overcomes the limitations imposed by the ARGOS System, which was chosen for its reliability Tests prove the seaworthiness of the buoy, and its ability to resolve different wave propagation directions.
Author (ESA)

N85-27344# Continental Shelf Inst , Trondheim (Norway)
ROUTINE WAVE AND METEOROLOGICAL MEASUREMENTS IN OFFSHORE AREAS USING ARGOS DATA SURVEILLANCE
S F BARSTOW, A LYGRE, and T AUDUNSON *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 28 p 1983 refs Sponsored by Norsk Hydro, Saga Petroleum, Statoil, British Petroleum, Philips Petroleum and IKU
(Contract NTNF-1810 7890)
Avail NTIS HC A16/MF A01

Buoys which measure wave direction and meteorological parameters were deployed off Norway and the Ivory Coast The ARGOS system is used for surveillance and near real time data control The heave wave spectrum, and spectral and time series parameters are calculated on board Results show good agreement with physical and geographical truths The buoys show that they are able to withstand severe environmental conditions, from 20 m waves off Norway to the high temperatures in the tropical waters off the Ivory Coast
Author (ESA)

N85-27345# Institute of Oceanographic Sciences, Wormley (England)
RESULTS OF AN INITIAL TRIAL OF A SATELLITE TELEMETERING BUOY MEASURING NEAR SURFACE CURRENT
P G COLLAR and C A HUNTER *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 8 p 1983
Avail NTIS HC A16/MF A01

A satellite telemetering drifting buoy which incorporates a vector averaging electromagnetic current meter for measuring near surface currents was tested Results show that the characteristics of the ARGOS system are not easily matched to the efficient collection of an evenly sampled time series The arrangement resulted at times in the transmission of much redundant data and in spite of this data were lost through uneven satellite coverage Nevertheless the transmission of data is inexpensive compared with the cost of position location For a drifter the advantage of using the transmission link rather than recording in-situ is that a data set can be accumulated even if the buoy is ultimately lost Likewise the output of a moored system can be monitored continuously for correct operation and there is an additional advantage in that the position of the buoy is available in the event of loss of mooring integrity
Author (ESA)

N85-27346# Pretoria Univ (South Africa) Mammal Research Inst
MOTIVATION FOR SATELLITE TRACKING OF SOUTHERN ELEPHANT SEALS MIROUNGA LEONINA AT SEA
M N BESTER *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 11 p 1983 refs Sponsored by South African Department of Transport
Avail NTIS HC A16/MF A01

The lack of explanations for the decline in southern elephant seal numbers is underlined, and as predators entirely dependent on marine feeding, a study of their spatial and temporal distribution during their pelagic existence is proposed. The development of a transmitter subject to Service ARGOS specifications, and admittance to this system would be the only cost effective method to study the movement of elephant seals in the Southern Ocean
Author (ESA)

N85-27347*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md Marine Science Center
THE ARGOS SYSTEM USED FOR TRACKING GRAY WHALES
B R MATE (Oregon State Univ , Newport), D BEATY (Telonics), C HOISINGTON, R KUTZ, and M L MATE (Oregon State Univ , Newport) *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 56 p 1983 refs Sponsored by Minerals Management Service, Anchorage and Office of Naval Research
Avail NTIS HC A16/MF A01 CSCL 05B

The development of satellite whale tags used to track gray whales in the eastern north Pacific Ocean is summarized Two gray whales were radio-tagged in San Ignacio Lagoon (Mexico) and tracked on their northbound migration One of the transmitters was modified to record and relay depth-of-dive information at 15 sec intervals throughout the course of the dive Technical elements of data acquisition and analysis are outlined The major biological findings are discussed
Author (ESA)

N85-27351# Norwegian Meteorological Inst , Blindern
AN OPERATIONAL BUOY NETWORK COLLECTING METEOROLOGICAL DATA
C K JENSEN *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 11 p 1983
Avail NTIS HC A16/MF A01

The network of drifting buoys in Norwegian waters is described Norwegian participation in the First GARP Global Experiment in the Southern Ocean (air pressure and sea surface temperature measurement) is outlined The use of an ARGOS local user terminal for meteorological data is summarized Positioning accuracy with ARGOS is treated
Author (ESA)

N85-27352# Royal Netherlands Meteorological Inst , De Bilt
AVAILABILITY OF THE ARGOS SYSTEM BASED ON THE ORBITAL CHARACTERISTICS OF THE TIROS-N SATELLITES
F GROOTERS *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 16 p 1983 refs
Avail NTIS HC A16/MF A01

The availability of NOAA-7 and 8 satellites for communicating with North Sea moored buoys was assessed, based on cyclic orbital frequencies, visibility periods spread over a number of days, and operational demands and data transmission limitations Results are unfavorable to heliosynchronous satellites Scientific utilization of a near polar orbiting satellite system is influenced by technical rather than time limitations, and offers a larger amount of data storage and processing capacity with simpler equipment
Author (ESA)

N85-27353# Danish Meteorological Inst , Copenhagen
OPERATIONAL EXPERIENCES WITH THE ARGOS SYSTEM IN GREENLAND
F JENSEN, K SVANEMSELLEM, and J TAAGHOLT (Technical Univ of Denmark, Lyngby) *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 14 p 1983 refs
Avail NTIS HC A16/MF A01

The Royal Danish Meteorological Institute agreed to maintain a minimum net of meteorological observation points in Greenland This obligation is partly fulfilled by automatic observing stations These stations are on remote locations and the most convenient method to communicate data is by METEOSAT and ARGOS data collecting systems In the most northern part of Greenland geostationary satellites decline below the horizon and only ARGOS can be used A ground station was established in Greenland to obtain real-time data from the ARGOS System Problems related to operating ARGOS platforms in the Arctic are discussed
Author (ESA)

N85-27354# Services Technique des Phares et Balises, Bonneuil-sur-Marne (France) Div Etudes Technologiques
CHECKING ON THE POSITION OF NAVIGATION MARKER BUOYS BY THE ARGOS SYSTEM
J F RACAPE *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 17 p 1983 refs
Avail NTIS HC A16/MF A01

Equipment operational requirements led the French lighthouse, beacon, and navigation office to use ARGOS data collection and location facilities A drifting criterion capable of generating an alert in the event of a drift of buoys fitted with ARGOS transmitters was derived from analysis of the system characteristics The criterion made it possible to accurately identify two drifts and one buoy location error The system allows operational monitoring of the equipment on buoys fitted with platforms Author (ESA)

N85-27355# Centre National pour l'Exploitation des Oceans, Brest (France)
CONTRIBUTION OF THE NOAA-7 AND 8 AND ARGOS PARTNERSHIP TO WHITE TUNA FISHING IN THE NORTHEAST ATLANTIC
J Y LEGALL *In* CNES Data Collection and Platform Location by Satellite. ARGOS Users' Conf 8 p 1983 refs In FRENCH, ENGLISH summary
Avail NTIS HC A16/MF A01

During the exploratory phase of fishing operations for white tuna in the NE Atlantic, an ARGOS keypad terminal was installed aboard the leading boat Data transmitted on a daily basis give the meteorological/oceanographic parameters used to decide on starting dates and subsequent progression of fishing activities Data relating to the daily catch is transmitted in order to analyze the fish catch/environment relationship from a hydroclimate point of view Such ground data gives an opportunity to calibrate surface temperature maps emanating from data obtained by NOAA-7 and 8 satellites Real time data covering the fish-catch/environment interface are used for the construction of a predictive model of white tuna fishing Author (ESA)

N85-27504# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
COMPARISON OF A DIFFUSION MODEL WITH DYE DISPERSION MEASUREMENTS TO STUDY TURBULENCE IN COASTAL WATERS
M R STEVENSON and H M INOSTROZAV Apr 1985 26 p refs Presented at the 1st Seminar de Modelagem Numerica do Mar, Sao Jose dos Campos, Brazil, 12-14 Dec 1984
(INPE-3492-PRE/729) Avail NTIS HC A03/MF A01

The operation of a coastal power plant provides the opportunity to conduct studies, which deals with circulation and horizontal mixing in coastal waters near a power plant This study was initiated with field experiments in which small quantities of rhodamine dye solution were dispersed in the inlet and outlet bays adjacent to the power station Sequential aerial photographs permitted the estimation of the magnitude of horizontal mixing (diffusion) coefficients The high cost of the dye, however, makes the utilization of diffusion models an attractive supplement to such studies, since the model can be run a number of times with varied parameters The simulated concentration fields can then be compared with the field experiments The simple diffusion model selected for this study is based on a point discharge of a dye solution The model assumes an isotropic field with a diffusion coefficient constant over the period of the study To simulate the two-dimensional dye patches, an equispaced grid (441 points) was used with 5m between grid points The time step was set for 10 minute intervals The results of the comparison between the numerical simulation and a dye experiment are discussed Author

N85-28438# Naval Postgraduate School, Monterey, Calif
AN ASSESSMENT OF THE POTENTIAL ROLE OF MULTISPECTRAL IMAGERY IN BATHYMETRIC CHARTING M.S. Thesis
R T JOY Sep 1984 98 p
(AD-A152460) Avail NTIS HC A05/MF A01 CSCL 08J

Previous research has demonstrated the feasibility of deriving water depth information from LANDSAT Multispectral Scanner (MSS) digital data However, previously published results, analysed together with two new case studies, show that the magnitude of errors (approximately 1-2 meters) in MSS singleband depth extimates is too large for direct production of bathymetric charts Better accuracy is possible, though, if MSS data are used to interpolate conventional soundings between survey tracklines, especially if the survey vessels obtain concurrent optical ground truth data If depth accuracy standards can be met, the MSS interpolation approach will be extremely cost effective In addition, MSS imagery is shown to be a useful tool for planning and managing conventional surveys A recommended set of procedures is outlined for incorporating MSS image data into an operational bathymetric mapping program A comprehensive program of development and operational demonstration surveys is recommended to convincingly establish the utility and cost effectiveness of these procedures GRA

N85-28529*# Jet Propulsion Lab, California Inst of Tech, Pasadena West Coast Satallite Time Series Advisory Group
TOWARDS A STUDY OF SYNOPTIC-SCALE VARIABILITY OF THE CALIFORNIA CURRENT SYSTEM
1 Apr 1985 43 p refs
(Contract NAS7-918)
(NASA-CR-175871, JPL-PUB-85-22, NAS 1 26 175871) Avail NTIS HC A03/MF A01 CSCL 08C

A West Coast satellite time series advisory group was established to consider the scientific rationale for the development of complete west coast time series of imagery of sea surface temperature (as derived by the Advanced Very High Resolution Radiometer on the NOAA polar orbiter, and near-surface phytoplankton pigment concentrations (as derived by the Coastal Zone Color Scanner on Nimbus 7) The scientific and data processing requirements for such time series are also considered It is determined that such time series are essential if a number of scientific questions regarding the synoptic-scale dynamics of the California Current System are to be addressed These questions concern both biological and physical processes E A K

N85-29433*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
RESEARCH REVIEW, 1983
Jan 1985 155 p refs Submitted for publication
(NASA-TM-86219, NAS 1 15 86219) Avail NTIS HC A08/MF A01 CSCL 04B

A variety of topics relevant to global modeling and simulation are presented Areas of interest include (1) analysis and forecast studies, (2) satellite observing systems, (3) analysis and forecast model development, (4) atmospheric dynamics and diagnostic studies, (5) climate/ocean-air interactions, and notes from lectures

N85-29505# Washington Univ, Seattle Polar Science Center
ARCTIC MIXED LAYER DYNAMICS Final Report
J MORISON Feb 1985 40 p
(Contract N00014-83-K-0115)
(AD-A153582) Avail NTIS HC A03/MF A01 CSCL 08J

Contents Seasonal Variations in the Upper Arctic Ocean as Observed at T-3 Hydrographic data from T-3 are analyzed to illustrate the behavior of the Arctic mixed layer The mixed layer depth fluctuates 11 m annually and mixed layer salinity fluctuates 0 32% ppt The fluctuations in total salt content are consistent with theoretical work by Maykut and are in phase with mixed layer depth, indicating changes in the mixed layer are controlled by salt flux Oceanographic Conditions in the Marginal Ice Zone North of Svalbard in Early Fall 1979 with an Emphasis on

Mesoscale Processes During September-October 1979 the Norwegian Remote Sensing Experiment was carried out in the marginal ice zone north of Svalbard Convergence of the ice cover is correlated with along-ice edge winds with the ice to the right, while divergence occurs during off-ice winds or calm conditions The Fram 3 Expedition On the fourteenth of March 1981, Fram 3 the third in a series of four U S manned ice camps, was established in the eastern Arctic Ocean at 84 32 N, 20 07 E for studies of physical and chemical oceanography, low-frequency underwater acoustics, geophysics, and the mechanics and propagation of waves through sea ice Salargos Temperature-Conductivity Buoys The design and testing of buoys capable of measuring temperature and salinity in ice covered oceans is described The buoys are implanted in the sea ice and collect water temperature and conductivity data from pairs of sensors tethered to a cable suspended below the ice The sensor data is collected and position is determined using the ARGOS satellite system GRA

N85-29507# Naval Ocean Research and Development Activity, Bay St Louis, Miss Oceanography Div
OPERATION GUIDING LIGHT-SCIENTIFIC PROGRAM AND FIELD PLAN. THE PILOT FIELD EXPERIMENT FOR NORDA PROJECT CHEMICAL DYNAMICS IN OCEAN FRONTAL AREAS Final Report
D A WIESENBURG Mar 1985 41 p refs
(AD-A153765, NORDA-TN-308) Avail NTIS HC A03/MF A01 CSCL 08J

This document describes the scientific program and field plan for operation GUIDING LIGHT, the pilot field experiment for the NORDA project Chemical Dynamics in Ocean Frontal Areas The study area for GUIDING LIGHT is the western North Atlantic Ocean off the eastern coast of the United States The operation will be conducted from 18 April to 10 May 1985 The fronts to be examined during this pilot experiment are the Gulf Stream front and shelf-slope front off New England GUIDING LIGHT will employ rapid sampling and analytical capabilities to measure chemical-biological-physical variations in surface waters at these frontal boundaries Both shipboard and remotely sensed observations will be made The field operation will be conducted from one ship (USNS BARTLETT), three aircraft, and the space shuttle (STS 51-B) Participates in GUIDING LIGHT include investigators from the Naval Ocean Research and Development Activity, the National Aeronautics and Space Administration, University of California, Texas A & M University, Old Dominion University, Florida State University, University of Southern Mississippi, and the University of Texas GRA

N85-29511# Royal Netherlands Meteorological Inst., De Bilt. Oceanografisch Onderzoek
FIRST RESULTS OF OCEANOGRAPHY UTILIZATION OF INFRARED HIGH RESOLUTION PICTURE TRANSMISSION IMAGES [EERSTE BEVINDINGEN BIJ OCEANOGRAFISCH GEBRUIK VAN IR-HRPT BEELDEN]
H WALLBRINK and G J PRANGSMA 1984 42 p refs In DUTCH
(KNMI-TR-59, B8479639, ISSN-0169-1708) Avail NTIS HC A03/MF A01

Qualitative interpretation of infrared photographs made by the satellites NOAA 6, NOAA 7, and NOAA 8 of the Norwegian Sea, the North Sea and the Atlantic Ocean to determine utility for research on dynamic processes in the ocean and the climate is discussed. The photographs were received by the High Resolution Picture transmission facility Making several prints with different enhancements in the playback mode of one registration provides the correct temperature fronts Mesoscale and enlarged small scale phenomena are clearly visible Author (ESA)

N85-29847# Eurosat S A , Geneva (Switzerland)
ERS ECONOMIC IMPACE STUDY Final Report
Paris ESA 15 Jul 1982 321 p
(Contract ESA-4692/81-F-FC(SC))
(ESA-CR(P)-1979) Avail NTIS HC A14/MF A01

The capability of an operational European remote sensing (ERS) system to generate usable products, and the impact of these products on the economics of the most sensitive oceanic activity domains were studied Spacecraft sensors and orbits, system configuration; ocean parameters and phenomena of relevance to users, and the processes of generating information presently used or likely to be used in oceanic activity were examined An economic analysis, based on statistics in oceanic activity sectors applicable to the ERS-1 participating countries and to the geographical areas of relevance was performed Maximum potential economic impact figures were modulated by the technological capability figures, and the outcome over the years 1988 to 1999 was projected using 3 different economic growth scenarios Author (ESA)

06

HYDROLOGY AND WATER MANAGEMENT

Includes snow cover and water runoff in rivers and glaciers, saline intrusion, drainage analysis, geomorphology of river basins, land uses, and estuarine studies

A85-30730
GROUND WATER EXPLORATION IN THE SAURASHTRA PENINSULA
B SAHAI, R K SOOD (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), and S C SHARMA (Gujarat Water Resources Development Corp , Gandhinagar, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 433-441 refs

The fact that groundwater in hard-rock formations is generally confined to fissures, fractures, joints and weathered zones makes space imagery extremely useful when prospecting for groundwater in hard-rock areas Keeping this in mind, multitemporal Landsat imagery of the Saurashtra region has been studied by employing visual/manual-interpretation techniques Various hydrogeomorphological features, such as abandoned channels, buried channels, lineaments, water bodies, vegetation, and floodplains, were mapped at a scale of 1 250,000 Using these maps, areas with groundwater potential were identified Resistivity surveys were conducted in selected areas Using these results, sites for exploratory drilling were chosen The pumping-test results at most of the sites were quite encouraging The present study therefore demonstrates the usefulness of remotely sensed data in groundwater exploration Author

A85-30731
INUNDATION MAPPING OF THE SAHIBI RIVER FLOOD OF 1977
A. S RAMAMOORTHI and P SUBBA RAO (National Remote Sensing Agency, Hyderabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 443-445

A major flood which occurred in the Sahibi basin in August 1977 is studied From an analysis of Landsat data, color-coded thematic photograph outputs showing the pre-flood condition and the condition of the basin immediately after the flood are prepared at 1 250,000 scale The area inundated by the floods is compared with a map based on aerial photographs showing the flooded area, and found to be satisfactory Digital and visual interpretation techniques are used in the study The reliability and usefulness of satellite data for mapping flood-inundated areas are demonstrated M D

A85-30732
THE EVALUATION OF HYDROGEOLOGICAL CONDITIONS IN THE SOUTHERN PART OF TAMIL NADU USING REMOTE-SENSING TECHNIQUES
S THILLAIGOVINDARAJAN (Public Works Department, Madras, India), S S KUMAR (National Remote Sensing Agency, Hyderabad, India), M JAYARAMAN, and P RADHAKRISHNAMOORTHY (Anna University, Madras, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 447-456

A85-30743
COASTAL MORPHOLOGY - A CASE STUDY OF THE GULF OF KHAMBHAT (CAMBAY)
S R NAYAK and B SAHAI (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 559-567 refs

Scans were carried out on the coastal area around the Gulf of Khambat using Landsat MSS spectral bands 6 and 7 at a 1 1 million scale The survey was performed to characterize erosive processes and sediment transportation and deposition in the area, to estimate the total sediment content and its seasonal variations, to map shoreline changes, to assess tidal effects on sedimentation and to map the coastal wetlands Sea truth current data were collected as a complement to the MSS data The sediments were of particular interest since they had already caused the closing of three port cities and were suspected to be carrying chemical pollutants from industrial areas in the Gulf to resort areas A large tidal range was credited with a net surplus of sediment carried toward land The data will be of use in monitoring and selecting industrial development areas and the effects of a new dam on the Mahi estuary Finally, preservation of mangrove vegetation on the coast was determined to be essential in any effort to slow erosion M S K

A85-32122
THE ANALYSIS OF LANDSAT MSS DATA FOR CHARACTERIZING SEDIMENT DISPERSAL IN THE BEAUFORT SEA
T PERROTT (Remotec Applications, Inc , St John's, Newfoundland, Canada), J HARPER (Woodward-Clyde Consultants, Victoria, British Columbia, Canada), P HILL, and S BLASCO (Geological Survey of Canada, Atlantic Geoscience Centre, Dartmouth, Nova Scotia, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 283-291 refs

A85-32123
APPLICATION OF REMOTE SENSING BY MEANS OF A SATELLITE IN SURVEYING THE WATER RESOURCES OF THE SAHEL [APPLICATION DE LA TELEDETECTION PAR SATELLITE A L'INVENTAIRE DES RESSOURCES EN EAU AU SAHEL]
C PREVOST and G ROCHON (Universite Laval, Sainte-Foy, Quebec, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 309-319 In French refs

A85-32124
A THERMAL STUDY OF THE WATERS OF THE ST. LAWRENCE ESTUARY BY MEANS OF THE HCMM SATELLITE - PRELIMINARY RESULTS [ETUDE THERMIQUE DES EAUX DE L'ESTUAIRE DU SAINT-LAURENT A L'AIDE DU SATELLITE HCMM - RESULTATS PRELIMINAIRES]
A LAVOIE, F BONN, M DUBOIS (Sherbrooke, Universite, Sherbrooke, Quebec, Canada), and M I EL-SABH (Quebec, Universite, Rimouski, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 321-330 In French Research supported by the Ministere de l'Education du Quebec and Universite de Sherbrooke, Natural Sciences and Engineering Research Council of Canada refs
(Contract NSERC-A-6043)

A85-32131
SPOT AND LANDSAT-4 SIMULATIONS: GENERALIZATION OF MRC BIOPHYSICAL-INVENTORY DATA ON THE UPPER ST. LAWRENCE PRELIMINARY ANALYSIS [SIMULATIONS SPOT ET LANDSAT-4: GENERALISATION DES DONNEES D'INVENTAIRE BIOPHYSIQUE DE LA MRC DU HAUT-SAINT-LAURENT ANALYSE PRELIMINAIRE]
P VINCENT, F BONN (Sherbrooke, Universite, Sherbrooke, Quebec, Canada), and P GANGLOFF (Montreal, Universite, Montreal, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 507-517 In French refs

A85-32138
THE USE OF LANDSAT IMAGES IN THE SELECTION OF HYDROELECTRIC-TRANSMISSION CORRIDORS ON THE NORTH SHORE PRELIMINARY STUDY OF THE PRINCIPAL SURFACE-MATERIAL TYPES [APPORT DES IMAGES LANDSAT DANS LA SELECTION DES CORRIDORS DE TRANSPORT HYDRO-ELECTRIQUE SUR LA COTE NORD - ETUDE PRELIMINAIRE DES PRINCIPAUX TYPES DE MATERIAUX DE SURFACE]
P LAFRAMBOISE (Societe de Developpement de la Baie James, Montreal, Canada), U LECONTE, and J P POMARES (Hydro-Quebec, Montreal, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 607-613 In French refs

A85-32146
CORRELATIONS BETWEEN SATELLITE DATA AND RADAR, THERMOGRAPHIC, AND MULTISPECTRAL SURVEYS FOR THE GEOMORPHOLOGICAL CHARACTERIZATION OF A REGION OF SOUTHERN QUEBEC [CORRELATIONS ENTRE LES DOCUMENTS SATELLITES, LEVES RADAR, THERMOGRAPHIQUES ET MULTISPECTRAUX EN VUE D'UNE INTERPRETATION GEOMORPHOLOGIQUE D'UNE REGION DU SUD DU QUEBEC]
A ROYER, P VINCENT, C DUBE, and F BONN (Sherbrooke, Universite, Sherbrooke, Quebec, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 717-732 In French Research supported by the Ministere de l'Education du Quebec, Natural Sciences and Engineering Research Council of Canada refs
(Contract NSERC-A-6043)

A85-33874
USE OF LANDSAT IMAGERY TO DETECT HYDROLOGIC INDICATORS OF THE NIGER RIVER REGIME
P A BRIVIO, E ZILIOLI (Commission of the European Communities, Joint Research Center, Ispra, Italy), and J-M GREGOIRE (CNR, Istituto per la Geofisica della Litosfera, Milan, Italy) ITC Journal (ISSN 0303-2434), no 3, 1984, p 191-199. Research supported by the European Development Fund refs

A85-35985
APPLICATIONS OF GOES VAS DATA TO NOAA'S INTERACTIVE FLASH FLOOD ANALYZER
L E SPAYD, JR (NOAA, Satellite Applications Laboratory, Washington, DC) IN International Conference on Interactive Information and Processing Systems for Meteorology Oceanography, and Hydrology, Los Angeles, CA, January 7-11, 1985, Preprints Boston, MA, American Meteorological Society, 1985, p 240-247 refs

In connection with a Flash Flood Program, the Synoptic Analysis Branch (SAB) of the National Environmental Satellite, Data, and Information Service has the task to produce satellite-derived estimates and short-range forecasts of heavy precipitation for operational use by the National Weather Service (NWS) The precipitation estimates are produced on the Interactive Flash Flood Analyzer (IFFA) Visible and infrared imagery provided by the Geostationary Operational Environmental Satellite (GOES) is routinely monitored Current GOES satellites are equipped with a Visible Infared Spin-Scan Radiometer (VISSR) Atmospheric Sounder (VAS) instrument The VAS provides derived data fields and multispectral imagery In 1986, this data will be operational and available for incorporation into IFFA routines Aspects of 1984 VAS assessment are discussed along with assessment difficulties, and a case study G R

A85-36565
INFERENCE OF RAIN RATE PROFILE AND PATH-INTEGRATED RAIN RATE BY AN AIRBORNE MICROWAVE RAIN SCATTEROMETER
M FUJITA, S YOSHIKADO (Ministry of Posts and Telecommunications, Radio Research Laboratories, Koganei, Tokyo, Japan), K OKAMOTO, and K NAKAMURA (Ministry of Posts and Telecommunications, Radio Research Laboratories, Kashima, Ibaraki, Japan) Radio Science (ISSN 0048-6604), vol 20, May-June 1985, p 631-642 refs

A modified dual-frequency algorithm (DFA) is used to examine the accuracy of rain rate profiles estimated with an airborne rain scatterometer/radiometer and a ground based radar Both radars functioned in the 10- and 35-GHz C-bands The DFA comprises a radar equation which accounts for, e g , the echo power, a calibration factor, the system loss, the distance between the radar and scattering volume, the effective reflectivity and the attenuation coefficient The attenuation is summed over a series of bins representing the range Total attenuation is then related to the rainfall rate Data from over-ocean rainfall shows that the algorithm overpredicts the rainfall rate, a situation indicating that further investigations are needed to characterize the sea surface microwave scattering characteristics M S.K

A85-37855
RAIN ESTIMATION IN EXTRATROPICAL CYCLONES USING GMS IMAGERY
R DELBEATO and S L BARRELL (Bureau of Meteorology, Melbourne, Australia) Monthly Weather Review (ISSN 0027-0644), vol 113, May 1985, p 747-755 refs

A technique is presented which provides estimates of rainfall from extratropical cyclones over an area of 125,000 sq km in southeastern Australia in simulated real time conditions It utilizes a statistical relation between blackbody temperature of cumuliform cloud and 90 minute rainfall totals to determine estimates of rainfall from cumuliform cloud, and approximates the lesser rainfall amounts from the stratiform pre-frontal cloud as a fixed proportion of rain from equivalent cumuliform cloud. It is based on the digitized 'HR Fax' imagery received at 3 h intervals from the Japanese Geostationary Meteorological Satellite (GMS) Five case studies are presented, each for a 24 hour period Rainfall estimates for rainfall districts within the area vary from the observed district averages, which were calculated from daily gage data, by an average of 22 percent The mean absolute error for districts is 4 2 mm Author

A85-37951
REMOTE SENSING FROM SATELLITES; PROCEEDINGS OF THE FIRST AND NINTH WORKSHOPS AND TOPICAL MEETING, GRAZ, AUSTRIA, JUNE 25-JULY 7, 1984
W D CARTER, ED (Globex, Inc , Reston, VA) and E T ENGMAN, ED (U S Department of Agriculture, Plant Physiology Institute, Beltsville, MD) Workshops and Meeting sponsored by COSPAR, IUGS, COSTED, and United Nations Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, 261 p For individual items see A85-37952 to A85-37977

Satellite remote sensing and its applications in hydrology are discussed in a series of national reports from various developing countries including East and South Africa, India, and Latin America. Papers are presented on dielectric properties and microwave remote sensing, ocean chlorophyll retrieval algorithms, and estimating canopy cover in drylands with Landsat MSS data Consideration is also given to remote sensing based continuous hydrologic modeling, Landsat thematic-mapper studies of land-cover spatial variability related to hydrology, and synthetic aperture radar capabilities for snow and glacier monitoring M D

A85-37961
LANDSAT MODEL FOR GROUNDWATER EXPLORATION IN NUBA MOUNTAINS, SUDAN
F AHMED, Y A HAGAZ (Khartoum University, Khartoum, Sudan), and A S ANDRAWIS (South Dakota State University, Brookings, SD) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 123-131 refs

A85-37969
APPLICATION OF SPACE SCIENCES TO HYDROLOGY AND WATER RESOURCES - THE POTENTIAL AND PRACTICAL USE AS REFLECTED BY WMO EXPERIENCE
J NEMEC (World Meteorological Organization, Hydrology and Water Resources Dept , Geneva, Switzerland) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 185-192

A85-37970
REVIEW OF REMOTE SENSING APPLICATIONS IN HYDROLOGY AND WATER RESOURCES MANAGEMENT IN INDIA
P D BHAVSAR (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 193-200 refs

The modern space technology of satellite remote sensing has been recognized in India as a useful tool for quick information gathering in many fields of resources management Significant work has been carried out in hydrology and water resources management related problems using the remote-sensing data from Landsat satellites, aircraft remote sensing, and Indian experimental remote-sensing satellites Bhaskara I and II In particular it has been found useful in surface-water resources and flood-plain mapping, monitoring of sediment and water pollution, water management in command areas, and ground-water targeting. Significant results of the work carried out are presented A brief description of the proposed program using the Indian

remote-sensing satellite to be launched in 1986 is also described
Author

A85-37971
REMOTE SENSING BASED CONTINUOUS HYDROLOGIC MODELING
E T ENGMAN (U S Department of Agriculture, Hydrology Laboratory, Beltsville, MD) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 201-209 refs

Two ways in which remote sensing can be used with continuous hydrologic models by providing a cost-effective way for obtaining input data and by providing synoptic measurements of various state variables are discussed Existing hydrologic models are reviewed with respect to the modification which must be made to use remotely sensed data It is shown that microwave and thermal infrared measurements have the greatest potential for use in hydrologic models The use of spatial data, mechanisms for extrapolating point data, and direct measurement of several hydrologic state variables, including soil moisture, surface temperature, snow water equivalent, frozen ground, and rainfall distribution, are some of the additional applications of remote sensing data Results from an aircraft experiment in which microwave data are collected to provide complete soil-moisture measurements over a small research basin are presented and discussed with respect to their application in continuous hydrologic simulation models
M D

A85-37972* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
LANDSAT THEMATIC MAPPER STUDIES OF LAND COVER SPATIAL VARIABILITY RELATED TO HYDROLOGY
S WHARTON, J ORMSBY, V SALOMONSON, and P MULLIGAN (NASA, Goddard Space Flight Center, Laboratory for Earth Sciences, Greenbelt, MD) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 217-226 refs

Past accomplishments involving remote sensing based land-cover analysis for hydrologic applications are reviewed Ongoing research in exploiting the increased spatial, radiometric, and spectral capabilities afforded by the TM on Landsats 4 and 5 is considered Specific studies to compare MSS and TM for urbanizing watersheds, wetlands, and floodplain mapping situations show that only a modest improvement in classification accuracy is achieved via statistical per pixel multispectral classifiers The limitations of current approaches to multispectral classification are illustrated The objectives, background, and progress in the development of an alternative analysis approach for defining inputs to urban hydrologic models using TM are discussed
M D

A85-37973* Maryland Univ , College Park
MODELLING THE ATMOSPHERIC BOUNDARY LAYER FOR REMOTELY SENSED ESTIMATES OF DAILY EVAPORATION
R J GURNEY (Maryland, University, College Park, MD), K BLYTH (Institute of Hydrology, Wallingford, Oxon, England), and P J CAMILLO (SAR, Inc , Riverdale, MD) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 227-230 refs
(Contract NAG5-395, NAS5-28200)

An energy and moisture balance model of the soil surface was used to estimate daily evaporation from wheat and barley fields in West Germany The model was calibrated using remotely sensed surface temperature estimates Complete atmospheric boundary layer models are difficult to use because of the number of parameters involved and a simplified model was used here The resultant evaporation estimates were compared to eddy correlation evaporation estimates and good agreement was found
Author

A85-37974
AN OBSERVATION OF SNOW MELTING PROCESS FROM REMOTELY SENSED DATA
T SAKAI, H NISHIKAWA, S ENDO (Nihon University, Narashino, Chiba, Japan), S TANAKA, and T SUGIMURA (Remote Sensing Technology Center of Japan, Tokyo, Japan) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 231-234

Observations of satellite images have shown that the snow melting in mountainous area proceeds more rapidly in the east-facing slope of the valley than in the west-facing one The energy for melting snow consists of the total from the atmosphere and from the solar rays The diurnal variation of the solar energy into the snow in the east-facing slope differs from that in the west-facing slope This causes the highest value of the instantaneous energy for melting snow to occur in the west-facing surface As one of the reasons for the above tendency, the difference of the highest value to melt snow may be taken into account
Author

A85-37975
USE OF SATELLITE IMAGES TO OBTAIN ACCURATE SNOWMELTING RUNOFF FORECASTS AND TO SURVEY GEOTHERMAL ACTIVITY ALONG LOS ANDES RANGE, CHILE
M F ARAYA (Universidad de Chile, Santiago, Chile) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 235-240 refs

A85-37976
SYNTHETIC APERTURE RADAR CAPABILITIES FOR SNOW AND GLACIER MONITORING
H ROTT (Innsbruck, Universitaet, Innsbruck, Austria) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 241-246 refs

The potential of SAR systems for monitoring the seasonal snow cover and glaciers has been investigated based on an airborne experiment in the Austrian Alps and on Seasat SAR and Shuttle Imaging Radar-A data X- and C-band SAR are useful sensors for mapping wet snow packs, while in L-band snow-covered and snow-free surfaces often cannot be separated SAR data in all three frequency bands provide valuable glaciological information
Author

A85-37977
HYDROLOGIC APPRAISAL OF RIVERS PLAN-FORM AT CONFLUENCE ZONE A CASE STUDY USING LANDSAT MSS DATA
M G SRINIVAS and G T MARATHE (Indian Institute of Technology, Bombay, India) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 247-251 refs

A study using Landsat MSS data from December 1972 and black and white aerial photographs from November 1969 to analyze the planform configuration at the confluence zone of the Wainganga and Khobragadi rivers in the central part of India is discussed The study confirms that the differences in the discharges in the rivers constitute the dominating factors causing changes in the riverform The possibility of using digital techniques for the analysis of the data illustrates the speedy access to data inputs
M D

A85-37982
DRAINAGE NETWORK ANALYSIS OF LANDSAT IMAGES OF THE OLYMPUS-PIERIA MOUNTAIN AREA, NORTHERN GREECE
T ASTARAS (Salonika, University, Salonika, Greece) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 673-686 refs

A85-38392
MACHINE CLASSIFICATION OF FRESHWATER ICE TYPES FROM LANDSAT-1 DIGITAL DATA USING ICE ALBEDOS AS TRAINING SETS
G A LESHKEVICH (NOAA, Great Lakes Environmental Research Laboratory, Ann Arbor, MI) Remote Sensing of Environment (ISSN 0034-4257), vol 17, June 1985, p 251-263 refs

A85-38587
CALCULATION OF THE EMISSIVITY OF ICE AND SNOW COVERS IN THE MICROWAVE REGION [RASCHET IZLUCHATEL'NOI SPOSOBNOSTI LEDIANOGO I SNEZHNOGO POKROVOV V SVCH DIAPAZONE]
R B BELICH IN Radio-physical method for the study of the natural environment Leningrad, Gidrometeoizdat, 1984, p 91-102 In Russian refs

Computational results concerning the reflection and transmission coefficients and emissivity of ice and snow in the microwave region are analyzed in terms of the cover's water content, density, and layer thickness variations for surface temperature near 0 C Qualitative analysis indicates that the reflection coefficient decreases with a decrease in density Moreover, with an increase in the water content, the layer thickness at which an asymptotic value of the reflection coefficient is established diminishes considerably It is suggested that the water content of the snow cover should be measured at wavelengths between 0 8-2 cm, whereas ice cover characteristics can be measured at larger wavelengths L T

A85-38709
MODELING OF SPATIALLY DISTRIBUTED OBJECTS USING REMOTE SENSING DATA [MODELIROVANIE PROSTRANSTVENNO-RASPREDELENNYKH OB'EKTOV S ISPOL'ZOVANIEM DISTANTSIONNOI INFORMATSII]
P A ZHUK and A A KAMISSARCHUK IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 49-53 In Russian

A graphic representation that was initially used for modeling hydrological systems is generalized to the case of random spatially distributed objects A description of a method, based on cluster analysis, for defining the structure of the system being modeled from thematic maps is presented Finally, two approaches to determining the optimal structure of the system are examined (1) the identification of the structure, functions, and parameters of the complex system, and (2) the maximum decomposition of the system followed by its composition L T

A85-38710
A GRAPHIC APPROACH TO THE MODELING OF RIVER DISCHARGE USING REMOTE SENSING DATA [GRAFOVYI PODKHOD PRI MODELIROVANII RECHNOGO STOKA S ISPOL'ZOVANIEM DANNYKH DISTANTSIONNYKH IZMERENII]
P A ZHUK and A A KOMISSARCHUK IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 53-57 In Russian

A85-38713
THE USE OF ARTIFICIAL OBJECTS IN CALIBRATING REMOTE SENSING DATA ON THE QUALITY OF NATURAL WATERS [PRIMENENIE ISKUSSTVENNYKH OB'EKTOV PRI ETALONIROVANII DANNYKH DISTANTSIONNOI INDIKATSII KACHESTVA PRIRODNYKH VOD]
IU V ZAVOLOKIN, V. A KRIULKOV, and S M SAZHIN IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space . Leningrad, Gidrometeoizdat, 1984, p 71-74 In Russian

The feasibility of producing an artificial reference sample for thematic processing of airborne and spaceborne imagery data is assessed It is argued that the use of an artificial reference leads to a considerable decrease in amount of work required for the collection of support hydrochemical information The discussion also covers the size of the cell containing the reference medium The method was tested by producing a reference on a rigid frame with four cells, each with a specific concentration of suspended particles The dependence of the film density on the particle concentration, obtained experimentally, can be used for concentration mapping L T

A85-38714
OPTIMIZATION OF THE REFERENCE CALIBRATION METHOD FOR REMOTE SENSING DATA ON NATURAL WATERS [OPTIMIZATSIIA METODA ETALONIROVANIIA DANNYKH DISTANTSIONNOGO ZONDIROVANIIA PRIRODNYKH VOD]
IU V ZAVOLOKIN, V A KRIULKOV, and A V LABAZIN IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 74-77 In Russian

Calibration of remote sensing data on natural waters by introducing an artificial reference sample is optimized by quantitatively decoding water surface imagery A model relating photometric characteristics of airborne and spaceborne images with the concentration of dissolved or suspended impurities is used to determine the minimum number of artificial key regions A comparison of remote sensing data with observations from ships on the Lake Baikal revealed a relative error of 3-21 percent L T

A85-38817
WETLANDS CLASSIFICATION USING LANDSAT THEMATIC MAPPER DATA UNSUPERVISED CLASSIFICATION APPROACH
K. A RICHARDSON (Rhode Island, University, Narragansett, RI) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p. 154-158 refs

The conduction of a survey from the ground in the case of the wetland environment is very difficult, while the recent use of satellite data to aid in the analysis of wetlands has been limited for the most part by the lack of surface resolution The present project has used a new Landsat sensor, the Thematic Mapper (TM), with an improved surface resolution (30 meters or 0 25 acres) The satellite Landsat IV, launched in July 1982, utilizes the TM sensor This sensor records electromagnetic radiation from seven different bands A description of the current state of knowledge regarding the classification of coastal wetlands is given, and the method of analysis employed in the case of a study of Landsat TM data is discussed The data used is from the TM scene E-40145-14492, Row 11, Path 31, dated December 8, 1982 The scene is 185 km long by 185 km wide with the center point around Chatham, MA The analysis led to the identification of 31 classes of land cover G R

A85-38826* Technicolor Government Services, Inc , Moffett Field, Calif
USE OF THEMATIC MAPPER FOR WATER QUALITY ASSESSMENT
E M HORN and L A MORRISSEY (Technicolor Government Services, Inc , Moffett Field, CA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 244-252 refs
(Contract NAS2-11101)

The evaluation of simulated TM data obtained on an ER-2 aircraft at twenty-five predesignated sample sites for mapping water quality factors such as conductivity, pH, suspended solids, turbidity, temperature, and depth, is discussed Using a multiple regression for the seven TM bands, an equation is developed for the suspended solids TM bands 1, 2, 3, 4, and 6 are used with logarithm conductivity in a multiple regression The assessment of regression equations for a high coefficient of determination (R-squared) and statistical significance is considered Confidence intervals about the mean regression point are calculated in order to assess the robustness of the regressions used for mapping conductivity, turbidity, and suspended solids, and by regressing random subsamples of sites and comparing the resultant range of R-squared, cross validation is conducted M D

A85-38827
SPACEBORNE AND AIRBORNE RADAR, INFRARED AND THERMAL STUDIES OF COASTAL PROCESSES AT THE MISSISSIPPI DELTA, LOUISIANA
P MOUGINIS-MARK, C FERRALL, L GADDIS (Hawaii, University, Honolulu, HI), and S ZISK (Haystack Observatory, Westford, MA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 253-259 refs

A digital Space Shuttle Imaging Radar (SIR-A) scene of the Mississippi Birdfoot Delta, southern Louisiana has been analyzed to test the usefulness of spaceborne radars in the investigation of coastal environments Measurements of water inundation in an area of coastal marshland by the selective analysis of brightness histograms for image subscenes, and the application of simple variance and median value 'box car' filters to the morphological characterization of the area, are presented The potential use of these types of analyses using radars with different incidence angles is further considered in the context of airborne radar (SLAR) images Visible and near-IR U-2 aircraft images and a scene from the Landsat 4 Thematic Mapper are also discussed as further descriptors of the coastal and offshore environment of the Mississippi River Author

A85-39347
UTILIZATION OF AERIAL AND SPACE REMOTE-SENSING DATA STUDIES OF LAND WATER [ISPOL'ZOVANIE AEROKOSMICHESKOI INFORMATSII V ISSLEDOVANIIAKH VOD SUSHI]
V F USACHEV, ED Leningrad, Gidrometeoizdat (Gosudarstvennyi Gidrologicheskii Institut, Trudy, No 299), 1984, 135 p In Russian No individual items are abstracted in this volume

Papers are presented on such topics as space remote-sensing identification of river-discharge zones in central Asia, the use of remote sensing to assess anthropogenic effects on water resources of arid regions, satellite determinations of the times of formation and melting of mountain snow cover, and remote-sensing of snow melting near industrial centers Consideration is also given to radar measurements of lake ice thickness distribution, interpretation of ground-water icing conditions on multispectral photographs, and the study of flood characteristics on the basis of remote sensing Digital thematic processing methods in the study of land hydrology are reviewed, and an interactive system for the interpretation of remote-sensing data is described B J

N85-23204*# Agricultural Research Service, Durant, Okla
A FIRST EVALUATION OF LANDSAT TM DATA TO MONITOR SUSPENDED SEDIMENTS IN LAKES
F R SCHIEBE, J C RITCHIE, and G O BOATWRIGHT *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 337-348 Jan 1985 refs Prepared in cooperation with Agricultural Research Service, Beltsville, Md and Agricultural Research Service, Houston, Tex Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 08H

The use of LANDSAT to monitor and track changes in the water quality of Lake Chicot, Arizona was assessed using MSS and TM digital data from nine water sites Results show that (1) TM Bands 1, 2, 3, and 4 appear to be providing information on concentrations of particulate matter suspended in surface waters These bands are also highly interrelated for water samples, (2) preliminary evaluation indicates that TM Band 3 showed the best relationship to surface suspended solids, (3) TM Bands 5 and 7 are useful for separating water from nonwater areas, (4) the MSS Bands 2 and 3 can be related to suspended solids in surface water, as has already been shown from previous LANDSAT research, and (5) analysis of TM Band 6 indicates that while synoptic temperature patterns may be discerned, the digital sensitivity to a two degree temperature difference is low A R H

N85-23205*# California Univ , Santa Barbara
SNOW REFLECTANCE FROM THEMATIC MAPPER
J DOZIER *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 349-358 Jan 1985 refs Previously announced as N83-32144 Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01

Calculations of snow reflectance in all 6 TM reflective bands (i e , 1,2,3,4,5, and 7) using a delta Eddington model show that snow reflectance in bands 4,5, and 7 is sensitive to grain size Efforts to interpret the surface optical grain size for the spectral extension of albedo are described Results show the TM data include spectral channels suitable for snow/cloud discrimination and for snow albedo measurements that can be extended throughout the solar spectrum Except for band 1, the dynamic range is large enough that saturation occurs only occasionally The finer resolution gives much better detail on the snowcovered area and might make it possible to use textural information instead of the snowline as an index to the amount of snow melt runoff A R H

N85-23211*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
COMPARISON OF LAND COVER INFORMATION FROM LANDSAT MULTISPECTRAL SCANNER (MSS) AND AIRBORNE THEMATIC MAPPER SIMULATOR (TMS) DATA FOR HYDROLOGIC APPLICATIONS
J C GERVIN, Y C LU (Computer Sciences Corp , Greenbelt, Md), and R F MARCELL (Computer Sciences Corp , Greenbelt, Md) *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 421-430 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

Thematic mapper simulator (TMS) data produced a more accurate and spatially contiguous classification than MSS for the Clinton River Basin in Michigan While the accuracy of the 4-band TMS data set was as good as the 7-band, the 3-band TMS data sets were also better than the MSS The combination of bands selected based on the transformed divergence technique provided one band in each of the major regions of the spectrum visible (band 3), near IR (band 4), middle IR (band 5) and thermal IR (band 7) These results should be viewed with some caution, since the data are from a TMS rather than the actual TM and the MSS

data were obtained in early summer while the TMS was flown in late summer The higher accuracies for the developed categories (residential and commercial) should improve the predictions of runoff in flood forecasting models and of flood damage for damage calculation models appreciably A R H

N85-23223*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
REMOTE SENSING OF SNOW AND EVAPOTRANSPIRATION
T SCHMUGGE, ed Washington Feb 1985 176 p refs Proc of 2nd workshop held in Honolulu, Hawaii, 15-19 Nov 1983 Original contains color illustrations
(NASA-CP-2363, REPT-84B0036, NAS 1 55 2363) Avail NTIS HC A09/MF A01 CSCL 08L

The use of snowmelt runoff models from both the U S. and Japan for simulating discharge on basins in both countries is discussed as well as research in snowpack properties and evapotranspiration using remotely sensed data

N85-23225*# Science and Technology Agency, Tokyo (Japan) National Inst of Resources
GENERAL REPORT OF THE RESEARCHES OF SNOWPACK PROPERTIES, SNOWMELT RUNOFF AND EVAPOTRANSPIRATION IN JAPAN
K TAKEDA *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 7-8 Feb 1985
Avail NTIS HC A09/MF A01 CSCL 08L

A method was developed for estimating the distribution of snow and the snow water equivalent in Japan by combining LANDSAT data with the degree day method A snow runoff model was improved and applied to the Okutadami River basin The Martinec Rango model from the U S was applied to Japanese river basins to verify its applicability This model was then compared with the Japanese model Analysis of microwave measurements obtained by a radiometer on a tower over dry snow in Hokkaido indicate a certain correlation between brightness temperature and snowpack properties A correlation between brightness temperature and depth of dry snow in an inland plain area was revealed in NIMBUS SMMR data obtained from the U S Calculation of evaporation using airborne remote sensing data and a Priestley-Taylor type of equation shows that the differentiation of evaporation with vegetation type is not remarkable because of little evapotransportation in winter A R H

N85-23226*# Agricultural Research Service, Beltsville, Md Hydrology Lab
SNOWMELT-RUNOFF MODEL UTILIZING REMOTELY-SENSED DATA
A RANGO *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 9-27 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08L

Remotely sensed snow cover information is the critical data input for the Snowmelt-Runoff Model (SRM), which was developed to simulatke discharge from mountain basins where snowmelt is an important component of runoff Of simple structure, the model requires only input of temperature, precipitation, and snow covered area SRM was run successfully on two widely separated basins The simulations on the Kings River basin are significant because of the large basin area (4000 sq km) and the adequate performance in the most extreme drought year of record (1976). The performance of SRM on the Okutadami River basin was important because it was accomplished with minimum snow cover data available Tables show optimum and minimum conditions for model application, basin sizes and elevations where SRM was applied, and SRM strengths and weaknesses Graphs show results of discharge simulation A R H

N85-23227*# Science and Technology Agency, Tokyo (Japan) Environmental Research and Technology Inst
SNOWMELT RUNOFF MODEL IN JAPAN
K. ISHIHARA, Y NISHIMURA, and K TAKEDA *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 29-52 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08L

The preliminary Japanese snowmelt runoff model was modified so that all the input variables are of the antecedent days and the inflow of the previous day is taken into account A few LANDSAT images obtained in the past were effectively used to verify and modify the depletion curve induced from the snow water equivalent distribution at maximum stage and the accumulated degree days at one representative point selected in the basin Together with the depletion curve, the relationship between the basin ide daily snowmelt amount and the air temperature at the point above are exhibited homograph form for the convenience of the model user The runoff forecasting procedure is summarized A R H

N85-23228*# Science and Technology Agency, Tokyo (Japan) Environmental Research and Technology Inst
APPLICATION OF MARTINEC-RANGO MODEL TO RIVER BASIN IN JAPAN
K TSHIHARA, M INOUE, and K TAKEDA *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 53-59 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08H

Variables and parameters used in applying the Martinec-Rango model to Japan's Okutadami River basin are given The calculated inflow for three snowmelt seasons is shown in relation to the observed inflow When the peak inflow occurs, two values of the calculated and the observed do not coincide with each other A one day lag can be seen between them Most periods in the season (except peak stage) exhibited a good agreement A R H

N85-23229*# Science and Technology Agency, Tokyo (Japan)
DISTRIBUTION OF SNOW AND MAXIMUM SNOW WATER EQUIVALENT OBTAINED BY LANDSAT DATA AND DEGREE DAY METHOD
K TAKEDA, H OCHIAI, and S TAKEUCHI *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 60-64 Feb 1985
Avail NTIS HC A09/MF A01 CSCL 08H

Maximum snow water equivalence and snowcover distribution are estimated using several LANDSAT data taken in snowmelting season over a four year period The test site is Okutadami-gawa Basin located in the central position of Tohoku-Kanto-Chubu District The year to year normalization for snowmelt volume computation on the snow line is conducted by year to year correction of degree days using the snowcover percentage within the test basin obtained from LANDSAT data The maximum snow water equivalent map in the test basin is generated based on the normalized snowmelt volume on the snow line extracted from four LANDSAT data taken in a different year The snowcover distribution on an arbitrary day in snowmelting of 1982 is estimated from the maximum snow water equivalent map The estimated snowcover is compared with the snowcover area extracted from NOAA-AVHRR data taken on the same day The applicability of the snow estimation using LANDSAT data is discussed Author

N85-23230*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
MICROWAVE RADIOMETER OBSERVATIONS OF SNOWPACK PROPERTIES AND COMPARISON OF U.S. JAPANESE RESULTS
A T C CHANG *In its* Remote Sensing of Snow and Evapotranspiration p 65-74 Feb 1985
Avail NTIS HC A09/MF A01 CSCL 08L

Microwave data collected by field experiments over Vermont and Hokkaido and Nimbus-7 SMMR over North Dakota and Hokkaido were studied The measured 37 GHz brightness temperatures show considerable effect of volume scattering by snow grains The 37 GHz brightness for a new snowpack with

average grain radius of 0 25 mm is generally about 40 K higher than the naturally compacted pack with average grain radius of 0 4 mm The scattering effect is much less distinct for the 6 6 GHz However, the layering effect is much stronger at the longer wavelength For 10 7 and 18 GHz, the effect of layering and scattering vary due to different combinations of internal snow grain distribution and layering structures Over the Hokkaido test site, the SMMR data are too coarse for the snow field A better spatial resolution is required to study these snow fields A R H

N85-23231*# Chiba Univ (Japan) Inst of Color and Image Technology
STUDIES ON PHYSICAL PROPERTIES OF SNOW BASED ON MULTI CHANNEL MICROWAVE RADIOMETER
K TSUCHIYA and K TAKEDA *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 75-87 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08L

The analysis of the data observed over a snow field with a breadboard model of MSR (microwave scanning radiometer) to be installed in MOS-1 (Marine Observation Satellite-1) indicates that (1) the influence of incident angle on brightness temperature is larger in horizontal polarization component than in vertical polarization component The effect of incident angle depends upon the property of snow with larger value for dry snow, (2) the difference of snow surface configuration consisting of artifically made parallel ditches of 5 cm depth and 5 cm width with spacing of 10 and 30 cm respectively which are oriented normal to electrical axis do not affect brightness temperature significantly, and (3) there is high negative correlation between brightness temperature and snow depth up to the depth of 70 cm which suggests that the snow depth can be measured with a two channel microwave radiometer up to this depth Author

N85-23232*# Chiba Univ (Japan) Inst of Color and Image Technology
ANALYSIS OF NIMBUS-7 SMMR DATA
K TSUCHIYA, K TAKEDA (Science and Technology Agency, Tokyo), and K KOZAI (Science and Technology Agency, Tokyo) *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 89-97 Feb 1985 refs
Avail NTIS HC A09/MF A01 CSCL 08L

Measurements obtained with the SMMR OF NIMBUS-7 over Hokkaido snow field show that the relationship between snow depth and brightness temperature changes when snow depth becomes deeper than 50 cm Average brightness temperature of the daytime indicates negative correlations with snow depth except for 6 6 GHz channel data which indicates weak positive correlation Author

N85-23881# Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France) Service Hydrologie
THE ARGOS SYSTEM AND HYDROLOGY. RESULTS OBTAINED BY ORSTROM AND BENEFITS OF A DEGREE OF STANDARDIZATION
J CALLEDE *In* CNES Data Collection and Platform Location by Satellite 7 p 1980 In FRENCH, ENGLISH summary
Avail NTIS HC A07/MF A01

Hydrological monitoring stations in the White Nile flood plain in Southern Sudan and on the Faleme, a tributary of the Senegal river in Senegal transmit river water level and rainfall data via the ARGOS system The measured parameters being river water level and rainfall, a degree of standardization as regards the hardware and the processing methods was required The order in which sensor data are transmitted must be the same Sensor 1 (water level) has a 16-bit parallel Gray-code output, sensor 2 (rainfall) may have either a 16-bit parallel output (external counting) or a pulse output (internal counting) with the count encoded as a pure binary 16-bit code This degree of standardization cuts the cost of interfaces and considerably reduces the volume of processing software required, which means less risk of error This degree of standardization is compatible with readily available equipment Author (ESA)

N85-23882# Water Survey of Canada, Ottawa (Ontario).
HYDROMETRIC TELEMETRY IN CANADA
I A REID, K F DAVIES (Water Survey of Canada, Calgary, Alberta), and J CLARKE (Water Survey of Canada, Halifax, Nova Scotia) *In* CNES Data Collection and Platform Location by Satellite 8 p 1980 refs
Avail NTIS HC A07/MF A01

The use of satellite telemetry by the Water Survey of Canada (WSC) for the acquisition of hydrometric and related data is described All the operational requirements of the WSC can be met through the use of the geostationary GOES or the polar orbiting ARGOS systems The development of data reception and distribution facilities for GOES and ARGOS data will provide WSC users with the capacity and flexibility needed to meet their demands Author (ESA)

N85-24363# Compagnie pour l'Electronique, l'Informatique et les Systemes-Espace, Toulouse (France)
AUTOMATIC HYDROLOGICAL DATA COLLECTION FACILITY USING ARGOS
B FROMANTIN *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 4 p 1981
Avail NTIS HC A08/MF A01

A limnograph-ARGOS beacon interface card to overcome the problem of irregular satellite passages was developed to allow river level to be measured every 30 min and 16 sites to be measured simultaneously The card stores 14 successive limnograph measurements in the memory, eliminating the most dated one each time Author (ESA)

N85-24386# Electricite de France, Grenoble Div Technique Generale
MEASUREMENT OF WATER EQUIVALENT OF MOUNTAIN SNOW COVER
P GUILLOT *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 195-199 1982 refs In FRENCH, ENGLISH summary
Avail NTIS HC A09/MF A01

The ARGOS system was used to transmit daily high mountain snow layer measurements from areas of the Alps and Pyrenees too isolated to be connected to the wire network, and too deep in the surrounding relief to allow ground-ground VHF links The good performance of the ARGOS system led to ARGOS beacons being used with a network of profiling horizontal radioactive snow gages, which records the snow layer density profile once a day Author (ESA)

N85-24388# Swedish Meteorological and Hydrological Inst , Stockholm
HYDROLOGICAL DATA COLLECTION FROM SWEDISH MOUNTAIN AREAS
G WENNERBERG *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 209-213 1982 refs
Avail NTIS HC A09/MF A01

Swedish mountain stations transmit air temperature, precipitation and water level data They are installed in remote areas and operate under severe conditions The system of transmitting via satellite results in demands and possibilities of sensor equipment Pressure sensors can be used to measure water level at stations without stilling wells and access to electricity The ARGOS system means that automatic field stations can be set up in places without access to electricity or the telephone network, for hydrological runoff prediction Author (ESA)

N85-24389# Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France)
THE ARGOS SYSTEM AND HYDROLOGY: THE USE OF PLATFORM TERMINAL TRANSMITTER (PTT) WITH BUILT-IN MEMORY AND DIRECT RECEPTION BY THE SEINE BASIN HYDROLOGY SERVICE
J CALLEDE, J RENTIERE, and Y ROUQUEROL *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf p 215-224 1982 In FRENCH, ENGLISH summary
Avail NTIS HC A09/MF A01

An ARGOS platform transmitter terminal (PTT) with the entire ARGOS message capacity (256 bits) available in a built-in memory was built and deployed in the Seine basin The PTT was linked to a direct reception ARGOS station to eliminate the time delay caused by transmitting via ARGOS centers The station receives fewer messages than the complete ARGOS system, partly due to the use of an omnidirectional receive antenna There is a good degree of redundancy in the water level data, corresponding to any given hour of data collection time, the exact degree of redundancy depending on the time of day The experiment shows that the direct readout station provides timely data for forecasting and network management requirements, but that the DISPOSE file should be used if all 48 daily observations are required
Author (ESA)

N85-25340# Joint Publications Research Service, Arlington, Va
STUDY OF VOLGA RIVER DELTA USING SPACE PHOTOSURVEY MATERIALS Abstract Only
G F KRASNOZHON and Y S SOKOLOV *In its* USSR Rept Space (JPRS-USP-85-003) p 107 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 27-32 Original language document announced as A84-43204
Avail NTIS HC A08/MF A01

The use of space photographs to map deltas is examined, and a hydrographic map of the Volga delta compiled on the basis of space photographs is presented A comparison of this map with the hydrographic map of 1910 elucidates the dynamics of the Volga delta in the course of 65 years B J (IAA)

N85-27348# Office de la Recherche Scientifique et Technique, Bondy (France) Service Hydrologie
PRESENT STAGE OF UTILIZATION OF THE ARGOS SYSTEM BY THE ORSTOM HYDROLOGICAL SERVICE FOR HYDROMETRIC DATA COLLECTION
G RABBIA *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 6 p 1983
Avail NTIS HC A16/MF A01

Satellite telemetry utilization in hydrological studies in subtropical regions is described Tests to inventory the possibilities applicable to hydrology (rainfall, water height level, flow gaging and flood forecasts), test and select equipment (catchers, coders, power supply), and estimate the cost for converting a standard station were performed with low orbiting and geostationary satellites The data collection platforms used being of extremely reduced size made possible their installation in existing facilities without noticeable modifications The data are especially interesting since users can register from 15% to 20% more daily readings with a 97% accuracy rate Author (ESA)

N85-27349# National Dept of Water and Electrical Energy, Brasilia (Brazil)
THE ARGOS SYSTEM IN BRAZIL
P R M GARCIA *In* CNES Data Collection and Platform Location by Satellite ARGOS Users' Conf 3 p 1983
Avail NTIS HC A16/MF A01

The use of satellite linked hydrology networks to study the day-to-day hydrological regime of the Amazon and its tributaries, to acquire data for fishing, agriculture, water transportation, management of dams and other facets of the river basin's economic development is discussed Given the considerable problems of access in such a region, and the slow rate of change in water levels, the ARGOS System is suitable if there is no need to maintain or adjust clocks at the station Experiments on two hydrological stations, and operation of a VHF direct readout station confirm the usefulness of ARGOS Author (ESA)

N85-27499# National Environmental Satellite Service, Washington, D C Satellite Applications Lab
TECHNIQUE THAT USES SATELLITE, RADAR, AND CONVENTIONAL DATA FOR ANALYZING AND SHORT-RANGE FORECASTING OF PRECIPITATION FROM EXTRATROPICAL CYCLONES
R A SCOFIELD and L. E SPAYD, JR Nov 1984 58 p refs (PB85-164994, NOAA-TM-NESDIS-8) Avail NTIS HC A04/MF A01 CSCL 04B

A technique for estimating precipitation from extratropical cyclones using visible and infrared geostationary satellite imagery, radar data and conventional data is discussed Extratropical cyclone systems were divided into five categories For each category, schematics of evolution of cloud patterns associated with moderate to heavy precipitation were developed Using the schematics along with radar and conventional data, precipitation estimates (rainfall and snowfall) and short range forecasts were produced Verification was done on the estimates and forecasts produced from September 1982 through April 1983 GRA

N85-27501# Wyoming Univ, Laramie Dept of Atmospheric Science
CLOUD PHYSICS STUDIES IN THE SCPP (SIERRA COOPERATIVE PILOT PROJECT) Interim Report, Oct. 1983 - Sep. 1984
Sep 1984 134 p refs
(Contract DI-2-07-81-V0256)
(PB85-163095, AS147) Avail NTIS HC A07/MF A01 CSCL 04B

A case study of a katabatic frontal passage as observed by Sheridan Rawinsondes and the UW King Air aircraft is given Based on this case study and a preliminary summary of other frontal passages, the shallow orographic cloud which remains on the Sierra barrier following passage of upper level hyperbaroclinic zones and katabatic fronts usually contains a substantial amount of supercooled water The responses to seeding of clouds seeded with dry ice in the SCPP-1 seeding experiment during SCPP/84 is described No seeding effects were observed on the day when the randomization was NO SEED and distinct seeding effects were observed on an intentional SEED day The combined hydrometeor distributions from three PMS probes are described In the ice multiplication region centered at -5C the combined data are superexponential distributed such that it fits a straight line on a log-log plot GRA

07

DATA PROCESSING AND DISTRIBUTION SYSTEMS

Includes film processing, computer technology, satellite and aircraft hardware, and imagery

A85-30828
AERIAL PHOTO COVERAGE PLANNING - PROGRAMS TO HELP DETERMINE MISSION SPECIFICATIONS
J. A CAYLOR (U S Forest Service, San Francisco, CA) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 15-25

Acquisition of NEW resource project aerial photographs should be flight planned by the resource project leader The PHOTO MISSION PLAN is the result of properly relating photographic variables to resource project requirements Sets of photographic variables and project requirements which have proven useful are

discussed These are related through formulas to compute the following needed photo mission plan specifications. (1) Intervalometer setting, (2) number of flight lines, (3) flight line spacing on the planning map, (4) number of exposures per flight line, (5) number of exposures on the project area, (6) total project photo acquisition cost The algorithm has been programmed (AOS) for solution by the Texas Instruments TI 59, and also (Level II Basic) for the Radio Shack TRS80PC Model 2 Using the program, a variety of flight plan models can be quickly tested for conformity to technical, manpower, and budgeting requirements of a resource project Author

A85-30842
THE RMS TM RESOURCE MEASUREMENT SYSTEM, DESCRIPTION AND APPLICATIONS
R R MCHAIL, K H KRECKEL, and M A FIAMMI (Bausch and Lomb, Inc , Rochester, NY) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 147-150

The capabilities of the software based resource measurement Resource Management System for extracting quantitative data from zoom transfer scope remotely sensed imagery via a Ile microcomputer interface are described The scope yields color photographs for generating color, shape and form map images and thematic maps The software based system allows cursor or stylus tracing of the areas of interest, producing stored digitized boundaries which can be treated statistically The program is also amenable to digitizing maps Potential applications include lineament analysis, hydrological shoreline studies, and land surveys for taxation of urban, suburban and rural properties M S K

A85-30844
VIDEO COLOR INFRARED IMAGERY - A FUTURE NATURAL RESOURCE MANAGEMENT TOOL
P R NIXON, D E ESCOBAR, R L BOWEN, and A J RICHARDSON (U S Department of Agriculture, Agricultural Research Service, Weslaco, TX) IN Color aerial photography in the plant sciences and related fields, Proceedings of the Ninth Biennial Workshop, Orlando and Lake Alfred, FL, November 15-17, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 159-165 refs

A85-30951
EXTRACTION OF INFORMATION FROM REMOTELY SENSED IMAGES; PROCEEDINGS OF THE CONFERENCE ON TECHNIQUES FOR EXTRACTION OF INFORMATION FROM REMOTELY SENSED IMAGES, ROCHESTER INSTITUTE OF TECHNOLOGY, ROCHESTER, NY, AUGUST 16-19, 1983
P F HOPKINS, ED (New York, State University, Syracuse, NY) Conference sponsored by the Society of Photographic Scientists and Engineers and American Society of Photogrammetry Falls Church, VA, American Society of Photogrammetry, 1984, 180 p For individual items see A85-30952 to A85-30965

Subjects related to multispectral image analysis are discussed, taking into account a computer-assisted synthesis of information from multispectral imagery, stereo models from synthetic aperture radar, a 7 1/2 map-image extraction from precision processed Landsat Multispectral Scanner (MSS) and Thematic Mapper (TM) imagery using a microcomputer and EROS computer compatible tapes, and multiband image classification with a distributed architecture Other topics explored are concerned with recent developments in data acquisition from satellites, digital image processing techniques, thermal infrared image analysis techniques, and techniques for removal of radiometric image degradation Attention is given to resource inventory through an instructionally-based digital processing system, hierarchical stereo matching, a comparison of techniques for radiometric calibration of aerial infrared thermal images, techniques for removal of radiometric image degradation effects, and resolution estimation for the Landsat-4 Thematic Mapper G R

A85-30953
RESOURCE INVENTORY THROUGH INSTRUCTIONALLY-BASED DIGITAL PROCESSING SYSTEM
R LOUGEAY and D ASH (New York, State University, Geneseo, NY) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 15-19
(Contract NSF SER-81-60802)

The utilization of an instructionally-based interactive digital image processing system is discussed for resource inventory applications to assist public agencies The availability of both photographic and digital remotely sensed data at a local college, plus user-friendly image processing software developed for the mainframe computer, has attracted interest from regional, county and state resource managers A sample applications project is reviewed, including degrees of success and limitations which develop when the computer disk storage capacity and time-sharing capacity must be dedicated, as first priority, to instructional purposes Author

A85-30955
THE CONTRIBUTION OF THE HEAT CAPACITY MAPPING MISSION TO THE INTERPRETATION OF THERMAL INFRARED DATA
J C PRICE (U S Department of Agriculture, Hydrology Laboratory, Beltsville, MD) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 43-52 refs

A spectral window at 10-12 micrometers in the thermal infrared permits observations of surface temperature by satellite radiometry The Heat Capacity Mapping Mission (HCMM), launched in 1978, was the first satellite to acquire reasonably high resolution (600/sq m) thermal data at times of day favorable for estimation of surface thermal properties and the surface energy budget The techniques for inverting the satellite obtained temperatures to derive surface parameters rely on numerical simulation of surface temperature, or on analytic manipulation of the energy balance equation Two variables, surface wetness, which controls evaporation and hence mean surface temperature, and a heat storing capacity, which controls the diurnal excursion of surface temperature about the mean, are responsible for most observed temperature variability These variables may be estimated from the mid night (2 30 a m) and early afternoon (1 30 p m) data from the HCMM, or from similar data which are acquired by NOAA operational satellites Author

A85-30956
A COMPARISON OF TECHNIQUES FOR RADIOMETRIC CALIBRATION OF AERIAL INFRARED THERMAL IMAGES
J R SCHOTT, J D BIEGEL (Rochester Institute of Technology, Rochester, NY), and I MCCLEOD (Canadian Forces, Alberta, Canada) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 53-58 refs

Two methods of radiometric calibration of aerial infrared line scanner data are presented These methods are designed to account for atmospheric transmission and path radiance effects, thereby permitting direct measurement of surface radiometric temperatures The method used multiple flights over the same ground area at different altitudes This method has been repeatedly tested and yields surface temperature values within 0 4 deg (standard error) of kinetic temperature values The second method tested involved viewing the same points on the ground through two different viewing angles to acquire data for computation of the atmospheric parameters A comparison of these two methods yielded very small residual errors of 0 19 to 0 4 C The multiple view angle approach affords considerable potention because of

the ease of data acquisition compared to the multiple altitude technique Author

A85-30958
RADIOMETRIC CHARACTERIZATION OF THEMATIC MAPPER FULL-FRAME IMAGERY
M D METZLER and W A MALILA (Michigan, Environmental Research Institute, Ann Arbor, MI) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 72-80. refs

The Thematic Mapper carried by Landsat-4 provides new potential for monitoring earth resources from space This paper describes a study directed at determining the radiometric characteristics of Thematic Mapper image data, a step essential in the successful exploitation of this potential The overall quality of Thematic Mapper image data appeared good However, a few radiometric artifacts were observed in the data and were characterized One such effect is the tendency of the mean signal level to decay as the active mirror scan progresses, leading to a small droop in the signal level from West to East during the forward scan, and an East to West droop during reverse scan A second key finding was the detection of low-frequency noise which is quite noticeable (greater than 2 signal levels) in some detectors in Band 1 Preliminary correction procedures were developed for Band 1 Author

A85-30962
7 1/2' MAP-IMAGE EXTRACTION FROM PRECISION PROCESSED LANDSAT MULTISPECTRAL SCANNER (MSS) AND THEMATIC MAPPER (TM) IMAGERY USING A MICROCOMPUTER AND EROS COMPUTER COMPATIBLE TAPES
L D MILLER, Y K YANG, T CHENG, M J UNVERFERTH, and M G KIM (Nebraska, University, Lincoln, NE) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 115-125

A85-30963
MULTI-BAND IMAGE CLASSIFICATION WITH A DISTRIBUTED ARCHITECTURE
I J CURINGTON and S E CANNON (Floating Point Systems, Inc , Portland, OR) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 126-134 refs

Much research has gone into specialized hardware for remotely sensed imagery analysis applications, particularly in the use of Landsat data for feature classification analysis (2) This paper outlines a particular multi-band classifier and shows expected performance using the FPS-5000 Series array processor The advantage of distributed resources are shown in an optimized implementation of the algorithm in a particular procesing environment Author

A85-30964
DESCRIPTION OF TECHNIQUES FOR AUTOMATION OF REGIONAL NATURAL RESOURCE INVENTORIES
J DANGERMOND (Environmental Systems Research Institute, Redlands, CA) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 135-152

A85-31893
THEORY OF SINGLE SPACE PHOTOGRAPHS [TEORIIA ODINOCHNYKH KOSMICHESKIKH SNIMKOV]
L M BUGAEVSKII and A. M PORTNOV Moscow, Izdatel'stvo Nedra, 1984, 280 p In Russian. refs

The theory of single space remote-sensing photographs or images is considered from the viewpoints of the regularization of surfaces of single space photographs, external perspective azimuth projections of an ellipsoid with positive or negative images, perspective projection of the surface of an ellipsoid on the surface of a sphere, and the determination of the orientation elements of photographic images Consideration is also given to sidelooking radar images, space images obtained by scanning systems, the determination of the orientation elements of single images acquired by nonphotographic systems, analytical methods for the transformation of photographic and nonphotographic images, and the instrumented transformation of space photographs and methods for transferring elements of their images to a cartographic basis B J

A85-32105
CURRENT LIMITATIONS ON QUANTITATIVE AIRBORNE THERMOGRAPHY
D I ROSS (Ontario Centre for Remote Sensing, Toronto, Canada) and S E FRANKLIN (Waterloo, University, Waterloo, Ontario, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 43-48 refs

To evaluate the advantages of the digital format for thermography, a set of experimental color maps was produced, by the Ontario Centre for Remote Sensing, (OCRS) by digital means from airborne thermal infrared linescanner data The data were obtained in the 8 5 to 12 7-microns range over the cooling water discharge from the Bruce nuclear-power development site on Lake Huron Digital analysis of the data is performed using an ARIES-2 image analysis system, and the color maps are produced using software of the Applicon color plotting system, as well as OCRS-developed mapping software Analysis of the data is limited to a semiquantitative approach, in which the imagery is corrected for systematic errors noise and geometry but not for atmospheric attenuation and emissivity Consideration is given to the atmospheric correction of airborne infrared-linescanner data and to a conceptual design of an advanced scanner system M D

A85-32107
VIDEO IMAGE ANALYSIS
J VLECK and E CHEUNG (Toronto, University, Toronto, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 63-69 Research supported by the Natural Sciences and Engineering Research Council and Ontario Tree Improvement and Forest Biomass Institute

Major features of video imaging and image analysis systems for remote sensing applications are discussed briefly Examples are given of video image acquisition and analysis based on the LMS system These include change detection and forest stand map updating, stand delineation and species identification on large-scale aerial video, area measurement, soil moisture and drainage pattern enhancement and analysis, density analysis, camera distortion calibration and determination of spectral reflectance and transmittance of poplar leaves Author

A85-32108
THE STEREOSCOPIC ACCENTUATION OF SPOT IMAGES [L'ACCENTUATION STEREOSCOPIQUE D'IMAGES SPOT]
R SIMARD (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 81-87, 89, 90 In French refs

Data acquisition limitations may result in inaccurate determination of relief from SPOT HRV stereoscopic images A method of preprocessing stereoscopic pairs through simulated accentuation of the parallaxes has resulted in improved determination of relief The method was developed using simulated data from SPOT stereoscopic pairs in panchromatic and multispectral modes acquired from a site on the Chamouchouanne River in Quebec Author

A85-32109* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
TESTING THE RADIOMETRIC STABILITY OF HCMM THERMAL INFRARED DATA
R G WITT (NASA, Goddard Space Flight Center, Greenbelt, MD), R S SEKHON, and T B MINOR (Computer Sciences Corp , Silver Spring, MD) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 101-109 refs

A study conducted to test the radiometric stability of thermal infrared (TIR) data from the heat-capacity mapping mission (HCMM) satellites is considered The radiance values associated with various land use and cover types in a regional study area centered on Washington, D C are examined The study shows that for three different day TIR-data sets, the relative ranking of mean thermal values associated with five Level I and three Level II land-use/land-cover categories remains constant over time Although HCMM predicted temperatures show variability up to 5 C from ground observed temperatures, the thermal measurements recorded by the satellite are fairly stable as indicators of surface temperature A method for combining HCMM thermal data and Landsat multispectral scanner (MSS) data to improve the classification of Level I land-cover categories, and in particular the separability of urban and nonurban areas is described A merged HCMM-MSS data set is found to yield the best results in terms of thematic-map accuracy M D

A85-32111
STEREO VIEWABILITY OF PROPOSED RADARSAT IMAGERY
E DERENYI and A STUART (New Brunswick, University, Fredericton, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 137-144 Research supported by the Department of Energy, Mines and Resources and Natural Sciences and Engineering Research Council of Canada refs

Stereo viewability of a radar-stereo model which is affected by the vertical exaggeration factor, layover, shadow, and the nature of the terrain is investigated The angles of incidence govern vertical exaggeration which is not constant as in aerial photography, but decreases across the swath from near-range to far-range For an overlap of 60-80 percent the vertical exaggeration at the near-range of the overlap is larger than that at the far-range edge by a factor of between 1 8 and 2 0 It is shown that there is no direct relationship between the size of the stereo intersection angle and the vertical exaggeration, and that for moderate and high relief, stereo perception is possible with a 5-deg intersection angle Within the range of incidence angles planned for Radarsat (20 - 45 deg) the portion of imagery rendered unviewable by layover is relatively small, except in cases of extremely rugged terrain It is not anticipated that dead areas of radar shadow will be extensive enough to inhibit interpretation of the images M D

A85-32115
FIRST STEPS TOWARDS INTEGRATION OF REMOTE SENSING AND DIGITAL MAPPING [PREMIERS PAS VERS L'INTEGRATION DE LA TELEDETECTION ET DE LA CARTOGRAPHIE NUMERIQUE]
A GRENON, H AUDET, and A VERVILLE (Ministere de l'Energie et des Ressources du Quebec, Service de la Cartographie, Sainte-Foy, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 175-185 In French

To remedy the shortcomings of the Quebec joint digital-image analysis system (French designation, SCANIQ), a system which establishes a link between remote sensing and automated cartography is developed The system uses a plotter to reproduce outlines of the thematic zones obtained from the SCANIQ processing, and it allows the integration of the outlines of the zones, in the form of polygons, with the IGDS digital mapping system Theme files generated on SCANIQ or on any system of the ARIES family are used in the system The steps involved in the system are described It is shown that in passing directly to the plotter, the following editing possibilities are offered by the system the addition of map projection grids, annotation at the bottom of the map, and the choice of scale, division, and color nibs The system is applied to the preparation of small-scale maps (at 1 125,000) of water areas to the unaided visual interpretation of accented Landsat images, to the mapping of flooded zones, and to the localization of islands The future of interactive graphic systems in remote sensing is discussed M D

A85-32116
AUTOMATED CARTOGRAPHY AND GEOMORPHOLOGICAL BOUNDARY-UNIT DETECTION IN THE MOPTI-BANDIAGARA (MALI) REGION USING MULTISATELLITE DATA FROM LANDSAT, SIR-A RADAR, AND SPOT SIMULATION [CARTOGRAPHIE AUTOMATIQUE ET DETECTION DE CONTOURS DES UNITES GEOMORPHOLOGIQUES DE LA ZONE DE MOPTI-BANDIAGARA (MALI) PAR DONNEES MULTISATELLITES LANDSAT, RADAR SIR-A, SIMULATION SPOT]
C BARDINET, M BENARD, J M MONGET (Paris, Ecole Nationale Superieure des Mines, Valbonne, Alpes-Maritimes, France), J P BLANCK, and J TRICART (CNRS, Centre de Geographie Appliquee, Strasbourg, France) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 187-194 In French refs

A85-32120
AVALANCHE HAZARD MAPPING INTEGRATING LANDSAT DIGITAL DATA AND DIGITAL TOPOGRAPHIC DATA
O NIEMANN, G LANGFORD (Geo-Spatial Research Corp , Edmonton, Alberta, Canada), and G MORE (Alberta Recreation and Parks, Canmore, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 261-271 Research supported by the Boreal Institute for Northern Studies refs

A85-32140
LANDSAT STUDY OF CHANGES IN SURFACE COVER
Y J CHONG, V K VONG, and A C YEO (National University of Singapore, Singapore) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 639-643 Research supported by the National University of Singapore, Ministry of Trade and Industry (Contract MTI-RG09)

An overall assessment of the limits of applicability of Landsat gray-level imagery was performed on an HP3000 minicomputer The study focused on the imaging capabilities over an underdeveloped area of the Malaysian Peninsula by the South China Sea Normalized values were computed to lower the radiometric noise levels Ground truth spectral signatures for selected features were accumulated for comparisons with the satellite drea Attention was given to farmlands, beaches, forests, roads and urban areas The MSS data were found reliable for synoptic views of a region and for assessing the state of development M S K

A85-32141
ESTIMATION OF BIDIRECTIONAL REFLECTANCES BY LANDSAT-IMAGE ANALYSIS - PROBLEMS AND POSSIBLE SOLUTIONS [ESTIMATION DES REFLECTANCES BIDIRECTIONNELLES PAR ANALYSE DES IMAGES LANDSAT - PROBLEMES ET POSSIBILITES DE SOLUTIONS]
F CAVAYAS, G ROCHON (Universite Laval, Sainte-Foy, Quebec, Canada), and P TEILLET (Canada Centre for Remote Sensing, Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 645-664 In French refs

A85-32210#
APPLICATIONS OF LANDSAT DATA AND THE DATA BASE APPROACH
D T LAUER (U S Geological Survey, EROS Data Center, Sioux Falls, SD) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc , 1983, p 265-270 refs

A generalized methodology for applying digital Landsat data to resource inventory and assessment tasks is currently being used by several bureaus and agencies within the U S Department of the Interior The methodology includes definition of project objectives and output, identification of source materials, construction of the digital data base, performance of computer-assisted analyses, generation of output, and preparation of a final report The U S Geological Survey, Bureau of Land Management, U S Fish and Wildlife Service, Bureau of Indian Affairs, and National Park Service have used this generalized methodology to assemble comprehensive digital data bases for resource management Advanced information processing techniques have been applied to these data bases for making regional environmental surveys on millions of acres of public lands at costs ranging from $0 01 to $0 08 an acre Author

A85-32868
AN EVALUATION OF THE USE OF ATMOSPHERIC RADIANCES FOR WATER VAPOR RETRIEVAL IN A GLOBAL RETRIEVAL SYSTEM
A SANYAL, C A DEAN, J S PRASAD (S M Systems and Research Corp , Lanham, MD), and L M MCMILLIN (S M Systems and Research Corp , Lanham, MD; NOAA, National Environmental Satellite, Data, and Information Service, Washington, DC) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 76-79 refs

A85-33449* National Aeronautics and Space Administration National Space Technology Labs , Bay Saint Louis, Miss
THE USE OF LANDSAT-4 MSS DIGITAL DATA IN TEMPORAL DATA SETS AND THE EVALUATION OF SCENE-TO-SCENE REGISTRATION ACCURACY
J E ANDERSON (NASA, National Space Technology Laboratories, Earth Resources Laboratory, Bay St Louis, MS) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1122), vol 51, April 1985, p 457-462 Previously announced in STAR as N83-35462 refs

The MSS sensor on Landsat 4 is, in certain performance aspects, different from those of Landsats 1 through 3 These differences created some concern in the NASA research community as to whether individual data sets can be registered accurately enough to produce acceptable data sets for multitemporal data analysis The use of Landsat 4 MSS digital data in temporal data sets is examined and a method is presented for estimating temporal registration accuracy based on the use of an X-Y digitizer and grey tone electrostatic plots Results indicate that the RMS temporal registration errors are not significantly different from the temporal data sets generated using Landsat 4 and Landsat 2 data (33 35 meters) and the temporal data set constructed from two Landsat 2 data sets (33 61 meters) A derivation of the model used to evaluate the temporal registration is included Author

A85-33598
THE USE OF SPACE PHOTOGRAPHS FOR LANDSCAPE MAPPING [ISPOL'ZOVANIE KOSMICHESKIKH SNIMKOV PRI LANDSHAFTNOM KARTOGRAFIROVANII]
T V VERESHCHAKA, B V KRASNOPEVTSEVA, and V V USOVA (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR) Geodeziia i Aerofotos'emka (ISSN 0536-101X), no 1, 1985, p 99-103 In Russian

Results of a landscape analysis of Salyut-5 photographs of the earth surface are presented The study was carried out with the aim of compiling a landscape map of a region of Central Asia B J

A85-34351
EDGE- AND SHAPE-BASED GEOMETRIC REGISTRATION
T C HENDERSON (Utah, University, Salt Lake City, UT), E E TRIENDL, and R WINTER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wessling, West Germany) IEEE Transactions on Geoscience and Remote Sensing (ISSN 0196-2892), vol GE-23, May 1985, p 334-342 Research supported by the Deutsche Forschungsgemeinschaft refs

The standard method for geometric registration of images consists of selecting control points in the two images and computing the correlation maximum of small subimages containing the control points This method does not work well when applied to images taken at different seasons or with different sensors The use of edge-based registration has been proposed to overcome these difficulties but has so far achieved no better than picture raster element accuracy This paper presents edge- and shape-guided correlation (or comparison) of control point areas for the analysis of multitemporal and multisource data The direct correlation of control areas for registration is supplemented by comparison of descriptions of elementary objects, e g , drawn lines, borders, and edges, whose positions are known with subpixel accuracy These methods have been implemented as a set of image registration modules within the context of the DIBIAS image processing system Author

A85-34429* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
REDUCING LANDSAT MSS SCENE VARIABILITY
R. NELSON (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, MD) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 51, May 1985, p 583-593 refs

Landsat 1, 2, and 3 MSS data acquired for six different nonvegetated targets over a three-year period were used to determine which of five transformations was most useful for

reducing between-scene variability The following values were calculated from the MSS digital numbers (dn) (1) radiance, (2) reflectance, (3) reflectance corrected for changes in the earth/sun distance, (4) normalized dn (normalization equations proposed by ERIM researchers), and (5) band ratios Results indicated that reflectance calculations were most effective overall for reducing interscene variability, ratio proved most useful on the bright targets Author

A85-34438#
A CLASSIFICATION OF MSS DATA FOR LAND-COVER MAPPING
C DEGUCHI, M NUMATA (Kyushu University, Fukuoka, Japan), I YOKOYAMA (Nippon Koei Co , Ltd , Japan), and K MATSUO Kyushu University, Faculty of Engineering, Memoirs (ISSN 0023-6160), vol 44, Dec 1984, p 367-389 refs

A classification method has been developed for extracting the land-cover information from multispectral scanner (MSS) data effectively and for distinguishing the land-cover classes in accordance with this information The original land-cover classes are subdivided and photo-interpreted manually using a grid which divides each training area of color aerial photographs into hundreds of cells Multiple regression analysis in a stepwise manner is performed repeatedly, in which the number of the cells photo-interpreted as the classes and that of the pixels of MSS data forming clusters are used as the mutually dependent and independent variables Based on the statistical verification tested by F-ratio and t-value, which are derived from the multiple regression, the land-cover classes are defined and the clusters are related to the classes A maximum likelihood classifier is suggested, in which the classification is performed repeatedly until the a priori probabilities converge to a certain condition Author

A85-34865
TEXTURE ANALYSIS AND CLASSIFICATION OF AIRBORNE RADAR DATA WITH SYNTHETIC APERTURE [TEXTURANALYSE UND KLASSIFIZIERUNG VON FLUGZEUGRADARDATEN MIT SYNTHETISCHER APERTUR]
B PFEIFFER (Karlsruhe, Universitaet, Karlsruhe, West Germany) Bildmessung und Luftbildwesen (ISSN 0006-2421), vol 53, May 1985, p 100-107 In German Sponsorship Bundesministerium fuer Forschung und Technologie refs
(Contract BMFT-01-QS-103/0)

The European SAR-580 experiment discussed by Trevett (1983) has provided for selected European test areas digital data, obtained with the aid of aircraft Digital classification procedures have also been employed in the evaluation of the data However, it was found that, on account of the speckle effect, an image point related classification of nonpreprocessed original data does not provide useful results An improvement of the classification can be obtained by filtering the original data, or by an employment of texture parameters The latter approach makes it possible to extract features from the vicinity of an individual image point This investigation has the objective to study the feasibility of a use of texture parameters for land use classification, taking into account texture parameters employed in optical remote sensing The obtained results show that, in principal, the employed texture parameters are useful for the land use classification of SAR 580 data G R

A85-36283
STRUCTURES FOR GEO-INFORMATION AND THEIR APPLICATION IN SELECTIVE SAMPLING OF DIGITAL TERRAIN MODELS
B MAKAROVIC (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) ITC Journal (ISSN 0303-2434), no 4, 1984, p 285-295

A general framework is presented for structuring geo-information from a functional point of view A distinction is made between the basic information and the control data, and further between the semantic and metric domains Interrelationships are identified between information extraction, sampling and structuring For composite sampling for DTMs, the primary ingredient is distinct morphometric features to be extracted and sampled selectively Because manual extraction is subjective and therefore inconsistent, it needs to be systematized Hence structuring rules and appropriate classification schemes need to be established These refer to both the basic information and the control data, and further to the semantic and metric domains Information should be already structured in the feature extraction stages, thus before sampling The corresponding classification schemes provide a frame of reference for structuring information at collection and subsequent process stages Author

A85-37121
DIGITAL PROCESSING OF METEOROLOGICAL SATELLITE IMAGERY [OPYT TSIFROVOI OBRABOTKI IZOBRAZHENII S METEOROLOGICHESKIKH ISZ]
M V IVANCHIK, S I KLIUSHNIKOV, V A KROVOTYNTSEV, M V MARTYNOV, and A N SEREBRENNIKOV (Akademiia Nauk Ukrainskoi SSR, Morskoi Gidrofizicheskii Institut, Sevastopol, Ukrainian SSR) Issledovanie Zemli iz Kosmosa (ISSN 0205-9614), Mar -Apr 1985, p 111-116 In Russian refs

A processing algorithm and computer hardware for compiling maps of cloud cover from satellite photographic images are described The designs of the measurement and computing components of the system were patterned after the SM-3 computer The system permits simultaneous processing of cloudiness images obtained by several satellites The mathematical formula used to calculate the percentage of occultation due to cloud cover in an individual image is given, and preliminary results of an experiment to process NOAA-satellite images of cloud cover in the tropical Atlantic region are presented I H

A85-38271
A COMBINED PHOTOGRAMMETRIC AND DOPPLER ADJUSTMENT
J M ANDERSON (California, University, Berkeley, CA) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 51, June 1985, p 655-666 Research supported by the Naturvetenskapliga Forskningsradet refs

The feasibility of a combined, simultaneous adjustment of aerial photogrammetric data and Doppler satellite observations at ground stations is studied Photogrammetric and Doppler condition equations are developed and formed into one system for which a solution by the method of least squares is discussed The resulting system of equations is of massive proportions so that a simultaneous adjustment is not practical A sequential least-squares adjustment is possible and merits further study as a potential solution to the system Author

A85-38272
SELECTING BAND COMBINATIONS FROM MULTISPECTRAL DATA
C SHEFFIELD (Earth Satellite Corp , Chevy Chase, MD) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol 51, June 1985, p 681-687 refs

The question of selection of band subsets from multispectral image data, with particular reference to the choice of color combinations from Landsat-4 Thematic Mapper data, is addressed An algorithm for band subset selection is provided, and a relationship to multispectral image entropy is established Author

A85-38707
A CONCEPT FOR ESTABLISHING A DATABASE FOR A SUPPORT DATABANK (THROUGH AN EXAMPLE OF AN AGRICULTURAL BLOCK) [KONTSEPTSII POSTROENIIA INFORMATSIONNOI BAZY BANKA OPORNYKH DANNYKH /NA PRIMERE BLOKA 'SEL'SKOE KHOZIAISTVO'/]
IU G SIMONOV and G I BARVYN IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 29-40 In Russian refs

A concept for establishing a database for a support databank, an autonomous subsystem of a remote-sensing system, is introduced Empirical, computational, and advanced concepts are

detailed, the advanced concept includes the results of synchronous subsatellite measurements in the processing and interpretation of data retrieved from space A matrix recording technique is proposed for the subsatellite observations The example of a list of administrative-territorial regions is employed to illustrate the principles of coding the classifiers and organization the data retrieval system in the databank L T

A85-38711
AN ALGORITHM FOR RECONSTRUCTING CORRELATING SERIES OF GROUND-BASED AND REMOTE OBSERVATIONS [ALGORITHM VOSSTANOVLENIIA KORRELIRUIUSHCHIKH RIADOV NAZEMNYKH I DISTANTSIONNYKH NABLIUDENII]
V O KESELMAN, P. T KOTLOVSKII, and A A ANDREEV IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 57-60 In Russian

The problem of reconstructing missing values in a set of several correlating series of observations is examined by proposing an iteration algorithm with three-stages iterations The algorithm, developed for use in a linear regression model, makes it possible to analyze the information structure of the input data matrix in order to choose complete observation submatrices A criterion determined by the method of expert estimates is used to derive the optimal integral algorithm for reconstruction at each step The method was applied for reconstructing ground-based hydrological data with accuracy between 2 and 18 percent, depending on correlation coefficients and the volume of data, all missing information, constituting 20 to 40 percent of the total initial data, was constructed in some events L T

A85-38716
THE SENSITIVITY OF THE COMPUTATIONAL SCHEME FOR TAKING INTO ACCOUNT THE CONTRIBUTION OF ATMOSPHERIC HAZE TO VARIATIONS IN INITIAL DATA [CHUVSTVITEL'NOST' RASCHETNOI SKHEMY UCHETA VKLADA ATMOSFERNOI DYMKI K VARIATSIIAM ISKHODNYKH DANNYKH]
V V IVANOVA, V V KOZODEROV, and T M ROMANOVA IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 83-89 In Russian

Corrected-image brightnesses are computed from known initial brightnesses for varying instrumentation parameters, angular coordinates, and atmospheric conditions The effects of measurement errors, e g , instrumental noise and calibration errors, of atmospheric model inadequacies, and of the angular scanning conditions, in the radiation correction scheme (departure of sighting angles from nadir, inaccurate factor of reflection nonorthotropy, etc) are evaluated It is concluded that the largest errors are caused by uncertainties in the specification of the optical characteristics of the atmosphere L T

A85-38803* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
LANDSAT 4 AND 5 STATUS AND RESULTS FROM THEMATIC MAPPER DATA ANALYSES
V V SALOMONSON (NASA, Goddard Space Flight Center, Greenbelt, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 13-18 refs

Landsat-1, 2, and 3 have functioned successfully well beyond their design lifetimes of one year and provided a very sizable collection of data On July 16, 1982 with the successful launch of Landsat-4, a second generation of Landsat satellites was introduced Landsat-4 continues to make available the observational services which had been provided by the Multispectral Scanner (MSS) on Landsats 1-3 In addition, the new satellite is provided with an improved observational capability which is based on a utilization of the Thematic Mapper (TM) The system status (March 1984) of Landsat-4 is considered along with an evaluation of the MSS, and a description of the design and performance of the TM Attention is also given to the satellite Landsat-5, which was launched successfully on March 1, 1984, taking into account design modifications leading to improved performance and some scenes provided by the new spacecraft G R

A85-38806
ALGORITHMS FOR THE ESTIMATION OF FAILED DETECTOR DATA
B GUINDON (Canada Centre for Remote Sensing, Ottawa, Canada) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 39-46

The Thematic Mappers of Landsat-4 and Landsat-5 employ arrays of detectors in order to acquire either 16 or 4 lines of video per swath Due to failed detectors, partial data loss has already been experienced with the Landsat-4 sensor It can be expected that multiple detector arrays will be a feature of many future sensors, and the development of algorithms for the accurate estimation of failed detector data is needed A study has been conducted with the objective to compare the performance of a number of computationally simple replacement algorithms Bernstein and Lotspiech (1983) have suggested that information from adjacent bands might be usefully employed if adjacent band correlation is high For this reason, the present investigation is concerned with the development and evaluation of an adjacent band modulation technique Attention is given to replacement algorithms, the test data, the statistical parameters and test results, and implementation considerations G R

A85-38807* Technicolor Government Services, Inc , Moffett Field, Calif
INFORMATION CONTENT COMPARISON OF THEMATIC MAPPER, MULTISPECTRAL SCANNER AND AIRBORNE THEMATIC MAPPER DATA
J S BUIS, W ACEVEDO, D A ALEXANDER (Technicolor Government Services, Inc , Moffett Field, CA), and R C WRIGLEY (NASA, Ames Research Center, Moffett Field, CA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 47, 48 refs

It is pointed out that on August 12, 1983 a test of the Tracking and Data Relay Satellite System in conjunction with the operation of Landsat 4 provided both Thematic Mapper (TM) and Multispectral Scanner (MSS) data over Central California In addition, on August 12, NASA Ames Research Center (ARC) acquired Airborne Thematic Mapper (ATM) data with the high altitude U-2 aircraft Attention is given to the procedures and results of a study which is currently being conducted at ARC to take full advantage of the data collected on August 12, 1983 Use is made of a series of degradations which should provide a very close approximation of TM and MSS data G R

A85-38813
APPLICATION OF DIGITAL IMAGE ENHANCEMENT PROCESSING OF LANDSAT DATA FOR TERRAIN MAPPING OF SOUTHERN HUAIROU COUNTY OF BEIJING (PEKING), CHINA
S X NI (Nanjing University, Nanjing, People's Republic of China) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 108-116 refs

A85-38814
IMPACTS OF HIGH RESOLUTION DATA ON AN OPERATIONAL REMOTE SENSING PROGRAM
J A MASLANIK and C R SMITH (Technicolor Government Services, Inc , Denver, CO) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 117-124 refs

The increase in data volume associated with high resolution imagery such as TM and SPOT is a source of concern for managers of operational remote sensing programs To assess the impact of this increased processing requirement on The Bureau of Land Management's remote sensing facility, simulated MSS, TM, and SPOT data were processed to provide system performance figures In addition, spectral clustering measures for MSS and TM data were compared to estimate the effects of feature selection on cluster detail and variability Results show that increased tape and disk storage requirements will be the most significant factor affecting BLM's processing system Author

A85-38821* Purdue Univ , Lafayette, Ind
COMPARISON OF CLASSIFICATION SCHEMES FOR MSS AND TM DATA
P E ANUTA, L A BARTOLUCCI, D F LOZANO-GARCIA, J A VALDES, and C R VALENZUELA (Purdue University, West Lafayette, IN) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 180-184
(Contract NAS5-26859)

The launch of the Landsat-4 satellite in July 1982 provided the first full coverage from space of the 0 4-12 micron spectrum of the earth scene In addition to the green, red, and near IR bands of the MSS, the TM provides a band in the blue, two in the middle IR, and one thermal IR The paper describes spectral class analysis of coincident MSS and TM data to evaluate the contribution of the additional TM bands In addition, various classifiers are available which were applied to the TM data In the spectral class analysis, twice the number of separable classes was found in the TM data compared to the MSS data Author

A85-38824* California Univ , Santa Barbara
REFLECTANCE MEASUREMENTS FROM LANDSAT THEMATIC MAPPER OVER RUGGED TERRAIN
J DOZIER (California, University, Santa Barbara, CA) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 230-234 refs
(Contract NAS5-27463)

Spectral albedo measurements from the Landsat-4/5 Thematic Mapper require that spacecraft upwelling radiances be corrected for atmospheric absorption and scattering and for local surface illumination A two-stream model is developed, with a lower boundary condition that varies with incidence angle TM data must be registered to digital terrain data Reflectance from points in shadows can be used to estimate optical depth The primary application here is determination of the spectral albedo of snow The TM is better-suited for this purpose than the MSS because of its larger dynamic range Author

A85-38832* Maryland Univ , College Park
SCENE SEGMENTATION THROUGH REGION GROWING
R S LATTY (Maryland, University, College Park, MD) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 305-314 refs
(Contract NAG9-5)

A computer algorithm to segment Landsat Thematic Mapper (TM) images into areas representing surface features is described The algorithm is based on a region growing approach and uses edge elements and edge element orientation to define the limits of the surface features Adjacent regions which are not separated by edges are linked to form larger regions Some of the advantages of scene segmentation over conventional TM image extraction algorithms are discussed, including surface feature analysis on a pixel-by-pixel basis, and faster identification of the pixels in each region A detailed flow diagram of region growing algorithm is provided I H

A85-38833
ADAPTIVE FILTERING AND IMAGE SEGMENTATION FOR SAR ANALYSIS
D G GOODENOUGH, B GUINDON, J-F MEUNIER (Canada Centre for Remote Sensing, Ottawa, Canada), and N A SWANBERG (Intera Technologies, Ltd , Ottawa, Canada) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 315-324 refs

A new approach to image segmentation which uses adaptive filtering to reduce noise in a SAR image acquired over Makofen in the Federal Republic of Germany, is discussed The effects of adaptive filter parameters, edge operators, and segmentation parameters on segmentation and classification are explored Combinations of adaptive filter window sizes and edge operators are tested and a graph-theoretic segmentation algorithm is used The resulting segments in each image are compared to a manually defined edge image following segmentation The selected segmented image is classified, using an algorithm which performs a supervised classification computing the Euclidean distance between the segment means and those of a training set M D

A85-38845
EVALUATION OF LOCAL AND GLOBAL DEFORMATION MODELS FOR THE REGISTRATION OF SIMULATED SPOT IMAGES
M FORTIN (Societe Europeenne de Propulsion, Puteaux, Hauts-de-Seine, France), P T NGUYEN, W NIBLACK (IBM France, S A , Paris, France), and E BOQUET (Paris VII, Universite, Paris, France) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 412-420 refs

N85-22449# Joint Publications Research Service, Arlington, Va
EXPERIENCE IN COMBINED SPECIAL MAPPING USING SPACE INFORMATION Abstract Only
V A ASTAKHOVA, V V KOZLOV, and V I RYABCHIKOVA *In its* USSR Rept Space (JPRS-USP-85-001) p 79-80 4 Feb 1985 Transl into ENGLISH from Geod i Kartografiya (USSR), no 7, Jul 1984 p 40-44
Avail NTIS HC A07

Several research organizations in the USSR are carrying out experimental work for developing new types of maps for certain regions, including the subarctic region of the Northeastern USSR In areas such as the latter, inaccessibility and other field work difficulties dictate a heavy reliance on space photographs The difficulties in visual special interpretation of space photographs peculiar to the investigated area are discussed in relation to the

overall objective, i e , combining the special subject matter maps into one so-called complex mapping and the collating and integration of the special content maps which were initially compiled The difficulties can be overcome in part by compiling intermediate maps of natural complexes and separate interpretations of key elements, such as hydrography, distribution of Quaternary deposits, geological structure as expressed at the surface, etc A definite sequence for interpretation of space photographs was worked out The intricacies of geomorphological, geological and landscape photointerpretation are discussed
Author

N85-23186*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
LANDSAT-4 SCIENCE CHARACTERIZATION EARLY RESULTS. VOLUME 4: APPLICATIONS
J L BARKER, ed Washington Jan 1985 442 p refs Symp held in Greenbelt, Md , 22-24 Feb 1983 Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls , S D 57198 ERTS 4 Vol
(E85-10070, NASA-CP-2355-VOL-4, REPT-85B0115-VOL-4, NAS 1 55 2355-VOL-4) Avail NTIS HC A19/MF A01 CSCL 08B

The excellent quality of TM data allows researchers to proceed directly with applications analyses, without spending a significant amount of time applying various corrections to the data The early results derived of TM data are discussed for the following applications agriculture, land cover/land use, soils, geology, hydrology, wetlands biomass, water quality, and snow

N85-23187*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
OVERVIEW OF TM APPLICATIONS RESEARCH REPORTS
D L WILLIAMS *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 1-6 Jan 1985 ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

Applications-oriented users of TM data have every reason to be excited about the possibility of opening up other horizons using TM data The data appear to be of excellent quality, and the investigations conducted to date, although preliminary, substantiate the findings of earlier research conducted with simulated TM data Techniques used for sensor/data quality evaluation, data processing, analysis, and display, and comparisons of TM versus MSS data are summarized A R H

N85-23188*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
IMPACT OF THEMATIC MAPPER SENSOR CHARACTERISTICS ON CLASSIFICATION ACCURACY
D L WILLIAMS, J R IRONS, B L MARKHAM, R F NELSON, D L TOLL, R S LATTY (Maryland Univ , College Park), and M L STAUFFER (Computer Science Corp) *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 7-24 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 14B

A fixed effect, three factor (two levels per factor) analysis of variance was used to quantitatively assess the significance of the improved spectral, spatial and radiometric resolution capabilities of the LANDSAT-4 thematic mapper sensor relative to the familiar MSS sensor TM data acquired over the Washington, D C area were progressively degraded in spectral, spatial and radiometric characteristics to simulate the MSS, and classification accuracies were derived in a consistent manner for all eight treatments in the ANOVA design Statistical testing of the significance of differences in classification accuracies between treatments indicated that the increased number of spectral bands and the improved quantization capabilities afforded by the TM sensor design would lead to significant improvements in classification accuracies attainable relative to MSS In contrast, however, the improved spatial resolution provided by the TM sensor did not enhance classification accuracy This latter result was felt to be more a function of the type of classification algorithms available A R H

N85-23189*# International Business Machines Corp , Palo Alto, Calif Scientific Center
ANALYSIS AND EVALUATION OF THE LANDSAT-4 MSS AND TM SENSORS AND GROUND DATA PROCESSING SYSTEMS: EARLY RESULTS
R BERNSTEIN and J B LOTSPIECH *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 25-90 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(Contract NAS5-27355)
Avail NTIS HC A19/MF A01 CSCL 14B

The MSS and TM sensor performances were evaluated by studying both the sensors and the characteristics of the data Information content analysis, image statistics, band-to-band registration, the presence of failed or failing detectors, and sensor resolution are discussed The TM data were explored from the point of view of adequacy of the ground processing and improvements that could be made to compensate for sensor problems and deficiencies Radiometric correction processing, compensation for a failed detector, and geometric correction processing are also considered A R H

N85-23194*# National Aeronautics and Space Administration Johnson (Lyndon B) Space Center,
PRELIMINARY EVALUATION OF THEMATIC MAPPER IMAGE DATA QUALITY
R B MACDONALD, F G HALL, D E PITTS, R M BIZZELL, S YAO, C SORENSEN, E REYNA, and J CARNES *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 153-162 Jan 1985 refs Prepared in cooperation with Lockheed Engineering and Management Services Co , Inc , Houston, Tex Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

Improvements in the ability to monitor renewable resources/vegegation due to improvements in the spatial, spectral and radiometric resolution of TM data were evaluated Results presented from the first 4 months of analysis presented include (1) geometric performance, (2) band-to-band registration, (3) modulation transfer function, and (4) crop separability performance Crop separability in Webster County, Iowa and in Mississippi County, Arkansas as determined by cluster and principal components analyses is assessed A R H

N85-23196*# Technische Univ , Munich (West Germany)
A CONCEPT FOR THE PROCESSING AND DISPLAY OF THEMATIC MAPPER DATA
R HAYDN *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 217-236 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

The thematic mapper system provides spectral information in seven carefully selected spectral bands The challenge is to devise the best approach for presenting this complex spectral information in a pictorial format which can be understood and accepted as a standard by the growing user community For photointerpretation purposes, the overall approach in the processing of multispectral, and especially of Thematic Mapper data is based on the Independent definition and optimization of individual panchromatic and spectral (interpretive) components and the combined display of these individual interpretive components in a perceivable manner Processing of the Thematic Mapper data within the framework of interpretive components requires the application of special intensity, hue, saturation (IHS) and synthetic stereo (SST) display techniques The results to date using these techniques demonstrate improved visual separability of spectral surface categories relative to standard multispectral color composites as well as a greater potential for conducting meaningful spectral-diagnostic analysis A R H

N85-23197*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

QUICK LOOK ANALYSIS OF TM DATA OF THE WASHINGTON, DISTRICT OF COLUMBIA, AREA

D L WILLIAMS, J R IRONS, B L MARKHAM, R F NELSON, D L TOLL, R S LATTY (Maryland Univ , College Park), and M L STAUFFER (Computer Sciences Corp , Silver Spring, Md) *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 237-250 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS

Avail NTIS HC A19/MF A01 CSCL 08B

Classification capabilities with TM data result from the interactive effects of all of the sensor's attributes which complicates a more quantitative evaluation of the effects of individual sensor improvements An experiment conducted to quantify the effect of individual sensor parameters (e g , spectral, spatial, and radiometric resolution) on classification accuracy is described on classification accuracy Preliminary results obtained using TM data acquired over the Washington, D C , area indicate that the additional number of spectral bands and quantization levels of the TM relative to the MSS increase capabilities for the recognition and discrimination of land cover/use categories by per-pixel maximum likelihood classification The refinement of spatial resolution, however, seems to hinder classification A R H

N85-23199*# Agricultural Research Service, Beltsville, Md Hydrology Lab

A PRELIMINARY COMPARISON OF THE INFORMATION CONTENT OF DATA FROM THE LANDSAT 4 THEMATIC MAPPER AND MULTISPECTRAL SCANNER

J C PRICE *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 271-280 Jan 1985 refs ERTS

Avail NTIS HC A19/MF A01 CSCL 05B

The thematic mapper (TM) on LANDSAT 4, acquires 6 spectral channels at 30 meter resolution as well as a thermal IR channel at 120 meter resolution Because both MSS and TM can acquire data simultaneously, the advantages and disadvantages of the two instruments can be directly compared The information content of the two instruments is compared for areas in a representative agricultural region Although the parameter information does not equate in an obvious way to the value or utility of the data, it provides a basis for physical interpretation By focusing on the redundancy of the digital data, the estimation of information content suggests possibilities for algorithms dealing with subsets of the image data, as well as transformations which reduce the total volume of data to be analyzed To the degree that a satisfactory description by a reduced data set is possible, there exist implications both for design of future satellite instruments and for analysis procedures A R H

N85-23200*# Technicolor Government Services, Inc , Sioux Falls, S Dak

EARLY RESULTS OF INVESTIGATIONS OF LANDSAT 4 THEMATIC MAPPER AND MULTISPECTRAL SCANNER APPLICATIONS

F G SADOWSKI, J A STURDEVANT, W H ANDERSON, P M SEEVERS, J W FEUQUAY, L K BALICK, F A WALTZ, and D T LAUER (EROS Data Center) *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 281-298 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS

Avail NTIS HC A19/MF A01 CSCL 08B

The TM digital data were evaluated for their potential to provide improved land cover information The analyses included (1) testing for information that may be offered by the new TM spectral bands, and (2) comparing data characteristics for equivalent spectral bands of the TM and MSS sensors The analyses were conducted on several large samples of pixels corresponding to five broad land cover classes Some TM spectral data are presented and evaluated as single-band, black-and-white images, and in several three-band color-composite images Some data transformations which can be used to present TM data in a manner that is potentially more useful for analysis or display are demonstrated These transformations enable generating hue, intensity, and saturation data space from red, green, and blue color space, as well as perspective view images A R H

N85-23202*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

PRELIMINARY COMPARISONS OF THE INFORMATION CONTENT AND UTILITY OF TM VERSUS MSS DATA

B L MARKHAM *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 313-324 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS

Avail NTIS HC A19/MF A01 CSCL 05B

Some preliminary indications were provided as to the relative merits of actual TM data versus MSS data for land cover mapping related applications Three analyses were designed which had sensitivity to the differences in spectral, spatial and radiometric parameters between the TM and MSS In the water body analysis, a primarily spatially related test, the detectability of small uniform targets was examined The principal components analysis, an examination of the inherent dimensionality of the data, was more spectrally and radiometrically related The spectral clustering analysis, also heavily spectrally and radiometrically influenced, provided information on the types of targets separable on TM versus MSS data These analyses were to be conducted with simultaneously collected LANDSAT-4 complete TM (7 band) and MSS (4 band) data In actuality, 4-band TM data, and archived LANDSAT-2 MSS data of the same area were used B G

N85-23207*# Natural Environment Research Council, London (England)

THE USE OF THEMATIC MAPPER DATA FOR LAND COVER DISCRIMINATION: PRELIMINARY RESULTS FROM THE UK SATMAP PROGRAMME

M J JACKSON, J R BAKER, J R G TOWNSHEND (Reading Univ , England), J E GAYLER (Reading Univ , England), and J R HARDY (Reading Univ , England) *In* NASA Goddard Space Flight Center LANDSAT-4 Sci Characterization Early Results, Vol 4 p 369-386 Jan 1985 refs Previously announced as N84-13631 Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS

Avail NTIS HC A19/MF A01

The principal objectives of the UK SATMaP program are to determine thematic mapper (TM) performance with particular reference to spatial resolution properties and geometric characteristics of the data So far, analysis is restricted to images from the U S and concentrates on spectra and radiometric properties The results indicate that the data are inherently three dimensional compared with the two dimensional character of MSS data Preliminary classification results indicate the importance of the near infrared band (TM 4), at least one middle infrared band (TM 5 or TM 6) and at least one of the visible bands (preferably either TM 3 or TM 1) The thermal infrared also appears to have discriminatory ability despite its coarser spatial resolution For band 4 the forward and reverse scans show somewhat different spectral responses in one scene but this effect is absent in the other analyzed From examination of the histograms it would appear that the full 8 bit quantization is not being effectively utilized for all the bands M G

N85-23208*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
PRELIMINARY STUDY OF INFORMATION EXTRACTION OF LANDSAT TM DATA FOR A SUBURBAN/REGIONAL TEST SITE
D L. TOLL *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 387-402 Jan 1985 refs Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

A substantial amount of spectral information is available from TM (as compared to MSS) data for a 14 25 square km area between Beltsville and Laurel, Maryland Large buildings and street patterns were resolved in the TM imagery While there was added information content in TM data for discriminating surburban/regional land cover, characteristics of MSS can improve land cover discrimination over TM when conventional classification procedures are used on digital data The improved qualitization of TM is likely valuable in situations where there are spectral similarities between classes The spatial resolution in TM decreased land cover discrimination as a result of increased within class variability For many general digital evaluations, inclusion of four bands representing the four spectral regions can provide much useful land cover discrimination Inclusion of TM 6 indicates an improvement in spectral class discrimination Of primary spectral importance is the discrimination between water, vegetative surfaces, and impervious surfaces due to differences in thermal properties Results from the principle component transformed data clearly indicates additional information content in TM over MSS
A R H

N85-23209*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
COMPARATIVE TECHNIQUES USED TO EVALUATE THEMATIC MAPPER DATA FOR LAND COVER CLASSIFICATION IN LOGAN COUNTY, WEST VIRGINIA
J O BRUMFIELD (Marshall Univ , Huntington, W Va), R G WITT, H W BLODGET, and R F MARCELL (Computer Sciences Corp , Silver Spring, Md) *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 403-414 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 08B

Several digital data processing techniques were evaluated in an effort to identify and map active/abandoned, partially reclaimed, and fully revegetated surface mine areas in the central portion of Logan County The TM data were first subjected to various enhancement procedures, including a linear contrast stretch, principal components and canonical analysis transformations At the same time, four general procedures were followed to produce six classifications as a means of comparing the techniques involved Preliminary results show that various feature extraction/data reduction techniques provide classification results equal or superior to the more straightforward unsupervised clustering technique Analyst interaction time for labelling clusters is reduced using the canonical analysis and principal components procedures, though the canonical technique has clearly produced better results to date
A R H

N85-23210*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
COMPARISON OF MSS AND TM DATA FOR LANDCOVER CLASSIFICATION IN THE CHESAPEAKE BAY AREA: A PRELIMINARY REPORT
P J MULLIGAN, J C GERVIN, and Y C LU (Computer Sciences Corp , Greenbelt, Md) *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 415-420 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

An area bordering the Eastern Shore of the Chesapeake Bay was selected for study and classified using unsupervised techniques applied to LANDSAT-2 MSS data and several band combinations of LANDSAT-4 TM data The accuracies of these Level I land cover classifications were verified using the Taylor's Island USGS 7 5 minute topographic map which was photointerpreted, digitized and rasterized The the Taylor's Island map, comparing the MSS and TM three band (2 3 4) classifications, the increased resolution of TM produced a small improvement in overall accuracy of 1% correct due primarily to a small improvement, and 1% and 3%, in areas such as water and woodland This was expected as the MSS data typically produce high accuracies for categories which cover large contiguous areas However, in the categories covering smaller areas within the map there was generally an improvement of at least 10% Classification of the important residential category improved 12%, and wetlands were mapped with 11% greater accuracy
A R H

N85-23212*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
RELATIVE ACCURACY ASSESSMENT OF LANDSAT-4 MSS AND TM DATA FOR LEVEL 1 LAND COVER INVENTORY
E M MIDDLETON, Y C LU (Computer Sciences Corp , Silver Spring, Md), R G WITT, and R S SEKHON (Computer Sciences Corp , Silver Spring, Md) *In its* LANDSAT-4 Sci Characterization Early Results, Vol 4 p 431-446 Jan 1985 refs ERTS
Avail NTIS HC A19/MF A01 CSCL 05B

Digital data for the Washington, DC scene simultaneously acquired by the LANDSAT-4 Multispectral Scanner (MSS) and the LANDSAT-4 thematic mapper (TM) was compared Classification success for the TM and MSS data sets was determined by a per pixel comparison with digitized ground verification data (GVD) These GVD were comprised of Level 7 land cover (developed, agriculture, forest, water, wetlands, and barren) for four USGS 7 5 minute topographic quadrangle maps The relative improvement in classification success for TM was between 11% and 14%, or about a factor of 1 3, for these data This represents a meaningful improvement in accuracy for Level 7 land cover categorization for TM relative to MSS, particularly when errors of omission and commission were considered
A R H

N85-23214*# Arizona Univ , Tucson
AN INVESTIGATION OF SEVERAL ASPECTS OF LANDSAT-5 DATA QUALITY Quarterly Progress Report
R C WRIGLEY, Principal Investigator 20 Dec 1984 17 p Sponsored by NASA ERTS
(E85-10096, NASA-CR-175531, NAS 1 26 175531) Avail NTIS HC A02/MF A01 CSCL 05B

Band-to-band registration, geodetic registration, interdector noise, and the modulation transfer function (MTE) are discussed for the Palmer County, TX scene Band combinations for several LANDSAT 4 and LANDSAT 5 scenes, the geodetic registration test for the Sacramento, CA area, periodic noise components in TM band 5, and grey level measurements by detector for Great Salt Lake (UT) dark water forescans and backscans are considered Results of MTF analyses of the San Mateo Bridge and of TM high resolution and aerial Daedalus scanner imagery are consistent and appear to be repeatable An oil-on-sand target was constructed on the White Sands Missile Range in New Mexico The two-image analysis procedure used is summarized
A R H

N85-23220*# MacQuarie Univ , North Ryde (Australia) School of Mathematics and Physics
PRECEDENCY CONTROL AND OTHER SEMANTIC INTEGRITY ISSUES IN A WORKBENCH DATABASE
C N G DAMPNEY *In its* MAGSAT Anomaly Field Data of the Crustal Properties of Australia 8 p 1983 refs
Avail NTIS HC A05/MF A01 CSCL 05B

Most database systems model the current state of a system of real world discrete and simple entities together with their relationships By examining instead a database system that is a workbench and models more complicated entities, a fresh perspective is gained Specifically, semantic integrity is analysed Four aspects distinct from physical integrity are identified, namely - access, failure, concurrency and precedency Access control is shown to be the consequence of semantic interdependency between data and its matching semantic routines Failure, concurrency precedency controls are concerned with preventing processes interfering with each other Precedency is a new concept in the database context It expresses a constraint between

processes that act on the database As processes create, update and delete entities they in general obey a partial ordering imposed by the semantics of their actions Precedency control ensures that data remains consistent with respect to this partial order
Author

N85-24779 Centre National d'Etudes Spatiales, Toulouse (France)
SCIENTIFIC EXPERIMENTS. PREPROCESSING OF SCIENTIFIC DATA [LES EXPERIENCES SCIENTIFIQUES. PRETRAITEMENT DES DONNEES SCIENTIFIQUES]
M AVIGNON *In its* Space Math for the Prepn and the Develop of Satellite Exploit p 935-981 1984 In FRENCH
Avail CEPADUES, Toulouse, France

Preprocessing of satellite-borne experiment data for spaceborne astronomy, geophysics, planetology, geodesy, oceanography, Earth observations, technology, and medicine and biology projects is introduced The data acquisition chain is described Passage from raw data to instrument data, calibrating, data sampling, passage from instrument to physically significant data, levels of processing, and data storage and access are outlined Examples of ocean circulation and sea state, GEOS magnetospheric wave, and gamma ray astronomy data preprocessing are given Author (ESA)

N85-25348# Joint Publications Research Service, Arlington, Va
IDENTIFYING LAND USE STRUCTURES OF MULTIZONAL AEROSPACE PHOTOGRAPHS USING DIGITAL DATA PROCESSING Abstract Only
I SCHMIDT and H STOYE *In its* USSR Rept Space (JPRS-USP-85-003) p 113 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 89-96 Original language document announced as A84-43214
Avail NTIS HC A08/MF A01

The land-use patterns of part of the Leipzig region are interpreted by analyzing relationships between the brightnesses of multispectral images (obtained by Salyut-6 in August 1978) transformed into digital form Interpretation results in the 640 to 680 nm bands are compared with land-use maps, and sufficiently good agreement is obtained It is noted that the interpreted patterns can serve as the basis for further regional generalization
B J (IAA)

N85-25349# Joint Publications Research Service, Arlington, Va
EXPERIENCE IN AUTOMATION OF DATA PROCESSING IN INTERPRETATION AND DEFINING OF LINEAR ELEMENTS FROM SPACE PHOTOGRAPHS Abstract Only
V Y GOLTVEGER, V A ILIN, and N M KUNINA *In its* USSR Rept Space (JPRS-USP-85-003) p 114 4 Mar 1985 Transl into ENGLISH from Issled Zemli iz Kosmosa (USSR), no 3, May-Jun 1984 p 97-105
Avail NTIS HC A08/MF A01

Two aspects of geological interpretation of space photographs are examined automation in the processing of data interpretation, and automated discrimination of linear elements directly from space photographs The automated image processing system was used The experiment was done with a space photograph of the Kola Peninsula enlarged to a scale of 1 500,000 The interpretation was used to compile a map of fissures to demonstrate the possibility of automatic processing computer compilation of a density map, a map of fissures with particular directions and rose diagrams, followed by comparison with results obtained in an experiment with automated discrimination of linear elements The procedures for preparation of each map are described Computer interpretation is characterized by great detail The method, however, has serious limitations, its applicability is limited to cases where most of the brightness drops on a photograph are composed of linear elements and the brightness drops caused by nonlinear elements are negligible The methods do not differentiate the discriminated linear elements, and it is impossible to reject elements of anthropogenic features The method is characterized by speed of processing, reproducibility of the results and sensitivity of the procedures
E A K

N85-27318*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
CNPQ/INPE LANDSAT SYSTEM: REPORT OF ACTIVITIES FROM OCTOBER 1, 1983 TO SEPTEMBER 30, 1984
J L DEBARROSAGUIRRE, Principal Investigator Oct 1984 30 p Presented at the LANDSAT Ground Station Operators Working Group and LGWOWG Data Distribution and Marketing Working Group Meetings, Sao Jose dos Campos, Brazil, Oct - Nov 1984 Sponsored by NASA Original contains imagery Original photography may be purchased from the EROS Data Center, Sioux Falls, S D 57198 ERTS
(E85-10097, NASA-CR-175612, NAS 1 26 175612, INPE-3323-PRE/623) Avail NTIS HC A03/MF A01 CSCL 02F

The status of Brazilian facilities for receiving, recording, processing, and distributing LANDSAT-generated products is presented Price lists and the revised LANDSAT-4 and -5 coverage map are included
A R H

N85-27319*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
NOISE CORRECTION ON LANDSAT IMAGES USING A SPLINE-LIKE ALGORITHM
N L VIJAYKUMAR, Principal Investigator and L A V DIAS Jan 1985 8 p refs Presented at the 4th Plenary Meeting of SELPER (Remote Sensing Latinamerican Experts Soc.), Santiago de Chile, 12-16 Nov 1984 Sponsored by NASA ERTS
(E85-10098, NASA-CR-175613, NAS 1 26 175613, INPE-3386-PRE/657) Avail NTIS HC A02/MF A01 CSCL 02F

Many applications using LANDSAT images face a dilemma the user needs a certain scene (for example, a flooded region), but that particular image may present interference or noise in form of horizontal stripes During automatic analysis, this interference or noise may cause false readings of the region of interest In order to minimize this interference or noise, many solutions are used, for instane, that of using the average (simple or weighted) values of the neighboring vertical points In the case of high interference (more than one adjacent line lost) the method of averages may not suit the desired purpose The solution proposed is to use a spline-like algorithm (weighted splines) This type of interpolation is simple to be computer implemented, fast, uses only four points in each interval, and eliminates the necessity of solving a linear equation system In the normal mode of operation, the first and second derivatives of the solution function are continuous and determined by data points, as in cubic splines It is possible, however, to impose the values of the first derivatives, in order to account for shapr boundaries, without increasing the computational effort Some examples using the proposed method are also shown
Author

N85-27371# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
LOCATION AND DATA COLLECTION SATELLITE SYSTEM ARGOS. USER'S GUIDE
1985 38 p
Avail NTIS HC A03/MF A01

The ARGOS satellite based localization system is described The user platform weighs only 2 kg, and can be carried by a wide range of targets, e g , balloons, icebergs, or animals The platforms are linked to NOAA/TIROS-N satellites, which act as relay stations for platform and satellite environmental and experiment data Special ground stations were built for direct data collection The localization system is based on Doppler positioning, with 60% of platforms located at each satellite passage Accuracy is within 100 m The data processing system assures 99% availability of data, 66% of the data are available 3 hr after measurement, 87 5% 6 hr Information includes raw and converted sensor data, and position, speed, and last localization date of platforms Real time data transmission is assured by the Global Telecommunication System Uses include wildlife radiolocation and environmental data collection
Author (ESA)

N85-27753# Maryland Univ , College Park Computer Vision Lab
APPLICATION OF HIERARCHICAL DATA STRUCTURES TO GEOGRAPHICAL INFORMATION SYSTEMS Final Contract Report, 27 Sep. 1983 - 26 Sep. 1984
H SAMET and A ROSENFELD Fort Belvoir, Va Army Engineer Topographic Labs. 13 Nov 1984 117 p
(Contract DAAK70-81-C-0059)
(AD-A152169, ETL-0376) Avail NTIS HC A06/MF A01 CSCL 08B

In Phase I of the project, a database was built that contained three maps supplied under the terms of the contract These maps described the flood plain, elevation contours, and landuse classes of a region in California The map regions were represented in quadtree form, and algorithms were developed for basic operations on quadtree-represented regions (set-theoretic operations, point-in-region determination, region property computation, and submap generation) The efficiency of these algorithms was studied theoretically and experimentally In Phase II of the project a quadtree based Geographic Information System was partially implemented, allowing manipulation of images storing area, point and line data This system included a memory management system to allow manipulation of images too large to fit into main memory, a software package to allow users to edit and update images, database management and map manipulation functions, and an English-like query language with which to access the database Phase III of this project primarily dealt with enhancements and alteration to this information system package, an evaluation of some of the design decisions, and the collection of empirical results to indicate the utility of the software and to justify the indicated design decisions Included with this report is a survey of appropriate data structures for future investigation vis-a-vis the current system GRA

N85-28441# National Aerospace Lab , Amsterdam (Netherlands)
DEVELOPMENTS IN REMOTE SENSING
1983 12 p In DUTCH, ENGLISH summary Sponsored by Netherland Agency for Aerospace Programs Original contains color illustrations
(B8580069) Avail NTIS HC A02/MF A01

The processing of thermal-infrared remote sensing data from data aircraft and satellites is described The analog data are, after a analog-to-digital conversion, checked and selected by a video quick-look system After correction for systematic errors they are presented as pictures showing the surface temperature differences on a color TV in which a variable color coding is used
Author (ESA)

N85-28877*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
EXPERIMENTAL PHILOSOPHY LEADING TO A SMALL SCALE DIGITAL DATA BASE OF THE CONTERMINOUS UNITED STATES FOR DESIGNING EXPERIMENTS WITH REMOTELY SENSED DATA
M L LABOVITZ, E J. MASUOKA, P W BRODERICK, T R GARMAN, R W LUDWIG, G N BELTRAN, P J HEYMAN, and L K HOOKER Apr 1983 22 p refs
(NASA-TM-85009; NAS 1 15 85009) Avail NTIS HC A02/MF A01 CSCL 05B

Research using satellite remotely sensed data, even within any single scientific discipline, often lacked a unifying principle or strategy with which to plan or integrate studies conducted over an area so large that exhaustive examination is infeasible, e g , the U S A However, such a series of studies would seem to be at the heart of what makes satellite remote sensing unique, that is the ability to select for study from among remotely sensed data sets distributed widely over the U S , over time, where the resources do not exist to examine all of them Using this philosophical underpinning and the concept of a unifying principle, an operational procedure for developing a sampling strategy and formal testable hypotheses was constructed The procedure is applicable across disciplines, when the investigator restates the research question in symbolic form, i e , quantifies it. The procedure is set within the statistical framework of general linear models The dependent variable is any arbitrary function of remotely sensed data and the independent variables are values or levels of factors which represent regional climatic conditions and/or properties of the Earth's surface These factors are operationally defined as maps from the U S National Atlas (U S G S , 1970) Eighty-five maps from the National Atlas, representing climatic and surface attributes, were automated by point counting at an effective resolution of one observation every 17 6 km (11 miles) yielding 22,505 observations per map The maps were registered to one another in a two step procedure producing a coarse, then fine scale registration After registration, the maps were iteratively checked for errors using manual and automated procedures The error free maps were annotated with identification and legend information and then stored as card images, one map to a file A sampling design will be accomplished through a regionalization analysis of the National Atlas data base (presently being conducted) From this analysis a map of homogeneous regions of the U S A will be created and samples (LANDSAT scenes) assigned by region
R J F

N85-29340# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
DIGITAL IMAGE MAPPING OF ANTARCTICA USING NOAA-7 AVHRR IMAGERY
W GOEPFERT *In its* Inform Relative to Cartography and Geodesy Ser 2 Transl , No 42, Vol 1 p 11-16 1984 refs Avail NTIS HC A03/MF A01

Satellite image map production from NOAA-7 AVHRR imagery is described The digital image processing steps are involved, i e , the 10 bit/8 bit-reformatting of the raw data The geometric and radiometric image mosaicing, and a final global contrast enhancement are described A digital image mosaic of scale 1 6 million of the Antarctic region 110 W - 0 - 90 E, 70 - 90 S is presented Author (ESA)

N85-29344# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany)
DYNAMIC RECTIFICATION OF AIRBORNE SCANNER DIGITAL IMAGE RECORDINGS [DYNAMISCHE ENTZERRUNG VON FLUGZEUGABTASTER-BILDAUFZEICHNUNGEN]
K J SEEGEL *In its* Repts on Cartography and Geodesy Ser 1 Original Repts , No 93 p 7-80 1984 refs In GERMAN, ENGLISH summary
Avail NTIS HC A06/MFA01

An operational procedure for the universal geometric rectification of perturbed digital image recordings is presented Developments in preprocessing, as e g , noise elimination, strict radiometric adaptation as well as the production of data-reduced edge images allow a clear, distinct and complete visualization of the geometric deviations and an appropriate interactive rectification The direct comparison of edge images covering the same area between the reference image and the image to be rectified simplifies the quality control of the real time rectification and offers the possibility to increase at will the accuracy by iterative processing by additional measurements The total procedure is demonstrated by the rectification of a multispectral airborne scanner recording onto a panchromatic digital orthophoto Author (ESA)

N85-29347# Army Engineer Topographic Labs , Fort Belvoir, Va
AIR PHOTO ANALYSIS, PHOTO INTERPRETATION LOGIC, AND FEATURE EXTRACTION
J N RINKER and P A CORL Jun 1984 351 p refs
(Contract DA PROJ 4A1-61102-B-52-C, DA PROJ 4A7-62707-A-855)
(AD-A153926, ETL-0329) Avail NTIS HC A16/MF A01 CSCL 14E

This is a status report about some of the research efforts within the Center for Remote Sensing (CRS) that are associated with image analysis Emphasis has been placed on the manual procedure of photo analysis, photo interpretation logic, classification

schemes, and knowledge based systems Information derived from other sources and information presented by contributors are acknowledged in the appropriate sections GRA

08

INSTRUMENTATION AND SENSORS

Includes data acquisition and camera systems and remote sensors

A85-30543#
REMOTE SENSING OF SURFACE AND NEAR SURFACE TEMPERATURE FROM REMOTELY PILOTED AIRCRAFT
J L COGAN (U S Army, Atmospheric Sciences Laboratory, White Sands Missile Range, NM) Applied Optics (ISSN 0003-6935), vol 24, April 1, 1985, p 1030-1036 refs

Surface temperature and atmospheric temperature near the surface may be estimated through a method that uses data from common types of airborne thermal infrared imager or other radiometric device having a narrow field of view The method accounts for effects of atmospheric attenuation, surface emissivity, reflected cloud and clear sky radiance, and sensor response to various levels of approximation Required meteorological measurements are the temperature of the intervening atmosphere and possibly the cloud base Data acquired by other investigators suggest accuracies approaching + or - 1 K for certain surfaces such as water and that similar accuracies in atmospheric temperature may be expected for certain vegetated surfaces Author

A85-30726
THE EVOLUTION OF SATELLITE-BASED REMOTE-SENSING CAPABILITIES IN INDIA
K KASTURIRANGAN (Indian Space Research Organization, Satellite Centre, Bangalore, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar-Apr 1985, p 387-400 Research supported by the Department of Space and Space Commission of India refs

This paper describes the Indian experience in evolving a satellite-based remote-sensing system The experimental earth observation program represented by the Bhaskara-1 and Bhaskara-2 satellites are discussed to highlight the different components of a satellite-based remote-sensing mission This is followed by a presentation of the key elements of the Indian remote sensing (IRS) satellite mission with particular reference to the details of IRS-1, the first of the planned satellites IRS-1 represents a major step in the transition from an experimental to an operational satellite-based remote-sensing system in India Author

A85-30957
ANALOG SIMULATION FOR RADIOMETRIC CORRECTION FOR SOLAR ANGLE
H B HALLOCK IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 61-71 refs

Practicality demands accuracy in correlating satellite sensor data to characteristic solar reflectance signatures of earth resources These data are sensitive to the natural variations in solar angle, and to large changes in offset viewing angle It is necessary to generate mathematical models for the correction of radiometric distortion resulting from these effects The most commonly discussed radiometric distortion is that due to atmospheric absorption, but that due to solar and viewing angle effects can be comparable Because of the difficulties and costs involved in accumulating enough data from field radiometry, this paper proposes extensive physical analog simulation A case is made for a large simulator facility incorporating both indoor and outdoor measuring equipment General design suggestions are given Author

A85-30960
COMPUTER-ASSISTED SYNTHESIS OF INFORMATION FROM MULTISPECTRAL IMAGERY
R F PASCUCCI and A F SMITH (Autometric, Inc , Falls Church, VA) IN Extraction of information from remotely sensed images, Preceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 91-104

A research program was conducted to evaluate and compare the geologic information content of the imagery from five different remote sensors In the investigation, use was made of a computer-assisted geographic information system called Autogis The area of study comprised two U S Geological Survey 1 250,000-scale quadrangles, including Utukok River, and Lookout Ridge, Alaska Within this area, a subarea of 5200 square kilometers was delineated for separate study The imagery examined consisted of real-aperture SLAR (APS/94D) imagery, synthetic-aperture SLAR (GEMS-1001) imagery, standard Landsat multispectral scanner (MSS) imagery, digitally enhanced Landsat MSS imagery, and color aerial photographs The largest area (5889 km) of geologic structure was detected by the enhanced Landsat MSS system, while the real-aperture SLAR system detected 5601 The last place is occupied by the standard-product Landsat MSS which detected 3704 km G R

A85-30961
STEREO MODELS FROM SYNTHETIC APERTURE RADAR
E S LEONARDO (Goodyear Aerospace Corp , Litchfield Park, AZ) IN Extraction of information from remotely sensed images, Proceedings of the Conference on Techniques for Extraction of Information from Remotely Sensed Images, Rochester, NY, August 16-19, 1983 Falls Church, VA, American Society of Photogrammetry, 1984, p 105-114 refs

For a long time, image interpreters and geoscientists have been intrigued by the possibility of using conventional stereoscopes and stereo plotters to obtain measurable three-dimensional models of synthetic aperture side-looking radar (SAR) imagery On the basis of studies, it has now been verified that a visual stereo radar model is not only theoretically possible, but that measurements compatible with the sensor's resolution and the terrain can be made using conventional stereo mensuration equipment Because of SAR's unique geometries and characteristics, the flight parameters required for stereo collection flights are much more stringent than for aerial photography Flightpath configurations are discussed, taking into account preferred configuration, and alternate configurations Attention is given to radar stereo measurements, steep depression angle effects, and edge guidance and flightpath effects G R

A85-31397
PROBING OF THE EARTH'S SURFACE AND THE ATMOSPHERE WITH AN AIRBORNE LASER SPECTROMETER
W WIESEMANN (Battelle Institut, Frankfurt am Main, West Germany), F LEHMANN (Muenchen, Universitaet, Munich, West Germany), and CH WERNER (Deutshe Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany) (European Physical Society, International Conference on Infrared Physics, 3rd, Zurich, Switzerland, July 23-27, 1984) Infrared Physics (ISSN 0020-0891), vol 25, Feb 1985, p 467-474 Research supported by the Bundesministerium fuer Forschung und Technologie refs

The principle of operation and results of laboratory measurements and flight implementation of an airborne coherent CW CO2-laser sensor are reported The spectrometer comprises an analog data processor and an optical arrangement, comparable to a Michelson interferometer, for transmission and heterodyne reception of two laser beams Spectral albedo measurements were performed in laboratory and in flights for different topographic targets, including grass, plowed farmland, and enhanced surface

moisture due to irrigation The mean deviation among different data sets is noted to be less than 15 percent. The differential albedo and absorption measurements indicate the feasibility of remote detection of minerals, soil moisture, oil spills, and atmospheric trace gases. A block diagram of the optical arrangement of the instrument is included L T

A85-31478
STUDY OF SPECTRAL-POLARIZATION CHARACTERISTICS OF NATURAL SURFACES FROM VARIOUS HEIGHTS [ISSLEDOVANIE SPEKTROPOLIARIZATSIONNYKH KHARAKTERISTIK PRIRODNYKH POVERKHNOSTEI S RAZLICHNYKH VYSOT]
V A ZAITSEVA, A E KRAVCHENKO, V E PLIUTA, I G SPITSYN, E A IANOVSKAIA, and A F IANOVSKII Zhurnal Prikladnoi Spektroskopii (ISSN 0514-7506), vol 42, Feb 1985, p 235-239 In Russian refs

Polarization characteristics of several types of natural formations in the regions of the Caspian Sea, Middle Asia, and Belorussia were studied from altitudes of 100-500 m with sighting angles between 0 and 50 deg at solar zenith angles between 40 and 60 deg Furthermore, the dependence of the degree and azimuth angle of polarization on the sighting azimuth angle was examined for water surfaces The results of these measurements are presented together with a description of the spectropolarimeter Nadir used for the observations The apparatus operated in the spectral region of 0 4-0 75 micron and used four interference filters with bandwidths between 4 and 6 nm L T

A85-32101
CANADIAN SYMPOSIUM ON REMOTE SENSING, 8TH, AND ASSOCIATION QUEBECOISE DE TELEDETECTION, CONGRESS, 4TH, MONTREAL, CANADA, MAY 3-6, 1983, PROCEEDINGS [SYMPOSIUM CANADIEN DE TELEDETECTION, 8TH, AND ASSOCIATION QUEBECOISE DE TELEDETECTION, CONGRES, 4TH, MONTREAL, CANADA, MAY 3-6, 1983, ACTES]
K P B THOMSON, ED (Canada Centre for Remote Sensing, Ottawa, Canada) and F BONN, ED (Sherbrooke, Universite, Sherbrooke, Canada) Symposium and Congress sponsored by the Association Quebecoise de Teledetection and Canada Centre for Remote Sensing Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, 855 p In French and English For individual items see A85-32102 to A85-32149

Selected papers covering a wide variety of earth-science applications and technical advances in remote sensing are presented The topics discussed include the influence of viewing geometry on vegetation measurements, current limitations on quantitative airborne thermography, video-image analysis, and stereoscopic accentuation of SPOT images Consideration is also given to remotely piloted aircraft for small-format aerial photography, the estimation of global solar radiance at ground level using METEOSAT visible-band data, and the mapping of land/soil degradation using multispectral data M D

A85-32119
CLOUDS - A FUNDAMENTAL LIMITATION TO SATELLITE REMOTE SENSING IN THE VISIBLE SPECTRAL REGION
S PETEHERYCH, B GOODISON, V SWAIL, and A SAULESLEJA (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 223-228

Operational uses of satellite remote sensing capabilities in activities such as agriculture, meteorology, oceanography and hydrology are constrained temporally by the presence of cloud cover These endeavors require data at intervals which may encounter sufficient cloudiness to degrade the ability of gathering valid information The opportunities for clear viewing are also determined by the altitude and orbital inclination of the satellite Synoptic weather data can be analyzed statistically to define the number of viewings necessary from a given remote sensor to ensure a high probability of capturing useful data during a preferred interval. Cloud cover statistics are provided for various Canadian areas The persistence of cloud cover over most of Canada makes questionable the usefulness of VHR visible and IR sensors, implying that alternative sensors must be identified M S K

A85-32211* Jet Propulsion Lab, California Inst of Tech, Pasadena
THE USE OF MULTISENSOR IMAGES FOR EARTH SCIENCE APPLICATIONS
D EVANS and B STROMBERG (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc, 1983, p 271-275

The use of more than one remote sensing technique is particularly important for Earth Science applications because of the compositional and textural information derivable from the images The ability to simultaneously analyze images acquired by different sensors requires coregistration of the multisensor image data sets In order to insure pixel to pixel registration in areas of high relief, images must be rectified to eliminate topographic distortions Coregistered images can be analyzed using a variety of multidimensional techniques and the acquired knowledge of topographic effects in the images can be used in photogeologic interpretations Author

A85-32212* Arizona Univ, Tucson
SHORT SUMMARY OF MULTISPECTRAL IMAGING SYSTEMS
P N SLATER (Arizona, University, Tucson, AZ) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc, 1983, p 276-279 (Contract NAG5-196)

This paper summarizes a survey of over 40 multispectral imaging systems that have been used during the past decade for earth resources studies from aircraft or spacecraft, or are presently in the proposal or design and development stage In addition, some short wave infrared systems are described including a recent NASA suggestion for a research remote sensing system for the 1990's Author

A85-32214* Jet Propulsion Lab, California Inst of Tech, Pasadena
A SHUTTLE IMAGING SPECTROMETER EXPERIMENT FOR THE LATE 1980'S
J B WELLMAN, A F H GOETZ, M HERRING, and G VANE (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc, 1983, p 286-292 NASA-supported research refs

The Shuttle Imaging Spectrometer Experiment (SISEX), proposed as a next experimental step in the development of advanced earth remote sensing technology, is capable of imaging the earth's surface simultaneously in 128 spectral bands covering the range from 0 4 to 2 5 micrometers Laboratory and field measurements have suggested the utility of high-spectral-resolution remote sensing, and an aircraft-borne precursor to the SISEX has demonstrated the ability to distinguish among differing vegetation and rock types - in certain cases making unique identifications The SISEX instrument utilizes an area-array focal plane, populated by visual- and infrared-sensitive detectors, to acquire simultaneous spatial and spectral information on a line-by-line basis The spectrum is dispersed by means of a prism spectrometer The performance analysis indicates that the scientific requirements for radiometric precision can be achieved using optics with an effective circular aperture of 11 cm Author

A85-32228*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
A CONCEPT FOR AN ADVANCED EARTH OBSERVATION SPACECRAFT
U M LOVELACE (NASA, Langley Research Center, Hampton, VA) IN NTC '83, Proceedings of the National Telesystems Conference, San Francisco, CA, November 14-16, 1983 New York, Institute of Electrical and Electronics Engineers, Inc , 1983, p 384-391

Remote sensing missions have been synthesized which could contribute significantly to the understanding of global environmental parameters Instruments capable of sensing important land and sea parameters are combined with a large antenna designed to passively quantify surface emitted radiation at several wavelengths A conceptual design for this large deployable antenna has been developed All subsystems required to make the antenna an autonomous spacecraft have been conceptually designed The entire package, including necessary orbit transfer propulsion, is folded to package within the Space Transportation System (STS) cargo bay After separation the antenna, its integral feed mast, radiometer receivers, power system, and other instruments are automatically deployed and transferred to the operational orbit The design resulted in an antenna with a major antenna dimension of 120 meters, weighting 7650 kilograms, and operating at an altitude of 700 kilometers Author

A85-32853* Jet Propulsion Lab , California Inst of Tech , Pasadena
REMOTE SENSING AND CLIMATE PARAMETERS
M T CHAHINE (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), R HASKINS (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA, Institute for Atmospheric Optics and Remote Sensing, Hampton, VA), J SUSSKIND (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD), and D REUTER (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Universities Space Research Association, Columbia, MD) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 10-16 NASA-supported research refs

The fundamental problem in deriving weather and climate procedures from satellite data lies in the proper selection of sets of sounding frequencies, and in the derivation of accurate algorithms that are capable of uncoupling the effects of these variables to retrieve the true value of each unknown parameter separately This uncoupling is presently based on the relaxation principle of Chahine (1968, 1970), which allows each parameter to be retrieved analytically without a priori assumptions as to the properties of the other unknowns in the field of view Attention is given to work conducted with the High Resolution IR Sounder and the Microwave Sounding Unit instruments carried by the NOAA Weather Satellite O C

A85-32863
EFFECTS OF WIND SPEED AND RAIN ON PRECIPITABLE WATER AND CLOUD LIQUID WATER BASED ON SCAMS DATA
W C SHEN, N C GRODY, and A GRUBER (NOAA, National Environmental Satellite, Data, and Information Service, Washington, DC) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 58-61 refs

The Nimbus-6 satellite's scanning microwave spectrometer (SCAMS) encompasses both a 22 23 GHz water vapor channel and a 31 65 GHz window channel, for deriving values of precipitable water and cloud liquid water content over the oceans A technique is presently developed for the estimation of errors introduced into precipitable water and cloud liquid water readings that are due to rain attenuation and high wind conditions This algorithmic method is applied to the actual cases of the 1975 storms, Typhoon Rita and Hurricane Caroline O C

A85-32871
ANGLE DEPENDENCE OF RADIANCES IN THE OZONE-SENSING CHANNEL OF THE HIRS
M P WEINREB (NOAA, National Environmental Satellite, Data, and Information Service, Washington, DC), D S CROSBY (NOAA, National Environmental Satellite, Data, and Information Service, American University, Washington, DC), and J C DEROSE (NOAA, National Environmental Satellite, Data, and Information Service, Washington, DC, Michigan, University, Ann Arbor, MI) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 87-89 refs

The results of implementation of the LOWTRAN algorithm, intended for correction of the angle dependence of radiances in the ozone-sensing channel 9 (9 6 microns) of the high-resolution IR radiation sounder (HIRS), are presented It is found that application of LOWTRAN caused considerable improvements in the magnitudes of the calculated radiances, at a zenith angle of 49 deg, for instance, the LOWTRAN produced a value almost coincident with in situ observations, whereas the original HIRS value of the limb darkening was 2 2 C less It is inferred from the analysis that the values of empirically derived parameters are not transferrable from one satellite instrument to another L T

A85-32936
MULTISPECTRAL IDENTIFICATION OF CLOUDS AND EARTH SURFACES USING AVHRR RADIOMETRIC DATA
I RUFF and A GRUBER (NOAA, National Environmental Satellite, Data, and Information Service, Washington, DC) IN Conference on Atmospheric Radiation, 5th, Baltimore, MD, October 31-November 4, 1983, Preprints Boston, MA, American Meteorological Society, 1983, p 475-478

An evaluation is conducted of the use of the Advanced Very High Resolution Radiometer (AVHRR) for the identification of various earth surface and cloud types within single observational fields The AVHRR is a multispectral cross-track scanner carried by the Tiros-N series satellites, furnishing an instantaneous field of view of about 1 km ground resolution at nadir It is found that a combination of observations from the various AVHRR channels can unambiguously differentiate broad categories of homogeneous surfaces, as well as many cases of mixed-surface types O C

A85-35124*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
RETRIEVAL OF CLOUD COVER PARAMETERS FROM MULTISPECTRAL SATELLITE IMAGES
A ARKING (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) and J D CHILDS (Systems and Applied Sciences Corp , Vienna, VA) Journal of Climate and Applied Meteorology (ISSN 0733-3021), vol 24, April 1985, p 322-333 refs

A technique is described for extracting cloud cover parameters from multispectral satellite radiometric measurements Utilizing three channels from the AVHRR (Advanced Very High Resolution Radiometer) on NOAA polar orbiting satellites, it is shown that one can retrieve four parameters for each pixel cloud fraction within the FOV, optical thickness, cloud-top temperature and a microphysical model parameter The last parameter is an index representing the properties of the cloud particle and is determined primarily by the radiance at 3 7 microns The other three parameters are extracted from the visible and 11 micron infrared radiances, utilizing the information contained in the two-dimensional scatter plot of the measured radiances The solution is essentially one in which the distributions of optical thickness and cloud-top temperature are maximally clustered for each region, with cloud fraction for each pixel adjusted to achieve maximal clustering Author

A85-36248* Jet Propulsion Lab, California Inst. of Tech, Pasadena
IMAGING SPECTROMETRY FOR EARTH REMOTE SENSING
A F H GOETZ, G VANE, J. E SOLOMON, and B N ROCK (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Science (ISSN 0036-8075), vol 228, June 7, 1985, p 1147-1153 NASA-supported research refs

Initial results of the novel remote earth sensing technique of imaging spectrometry, which is technically feasible from both spacecraft and aircraft platforms, indicate that the direct identification of surface materials on a picture-element basis is possible through proper sampling of absorption features in the reflectance spectrum Sensors of this type are able to acquire images simultaneously in 100-200 contiguous spectral bands Computerized data reduction and storage techniques are available for the large data sets thus generated, and novel analytic techniques are under development to maximize information content extraction O C

A85-36284
NAVIGATION AND SENSOR ORIENTATION SYSTEMS IN AERIAL PHOTOGRAPHY
F L J H CORTEN ITC Journal (ISSN 0303-2434), no 4, 1984, p 296-304

The principles of such navigation approaches as deduced reckoning, position fixing, and inertial navigation are reviewed, centering on the potential improvements to their accuracy in aerial photography. The in-flight performance of several systems is discussed, including distance measuring equipment and VOR stations, airborne tellurometer or aerodist, microwave beacon systems, computer controlled photo navigation system, and Doppler radar for planimetric position determination, and laser altimeter, statoscope, hypsometer, and airborne profile recorders for altitude determination Consideration is also given to the Global Positioning System Navstar, which consists of 18 orbiters (three satellites in each orbital plane) and is expected to provide an accuracy of + or - 3 5 m horizontally, 4 5 m vertically, and 0 05 m/s in speed Finally, the applications of the systems and the economic aspects of their operation are detailed L T

A85-36286
SURVEYING AND MAPPING WITH SPACE DATA
F J DOYLE (U S Geological Survey, Reston, VA) ITC Journal (ISSN 0303-2434), no 4, 1984, p 314-321

The accuracy of and requirements to the techniques of topographic mapping from space are examined using an elementary error model, which takes into account the errors in spacecraft position and sensor attitude An account is taken of the US map accuracy standards and the scale number of the map As an example, the results of mapping with Landsat data, obtained on an experimental basis by the Thematic Mapper, are analyzed, a comparison with a line map reveals that the published multicolor planimetric image map at 1 100,000 scale is deficient in the representation of small drainage features and urban street patterns Descriptions are also included of the SPOT, which will include two HRV linear array sensors, the Spacelab camera, the NASA large format camera, the LFC panoramic camera package, and film camera systems of the Soviet Union, such as the MKF-6 multispectral film camera and the KATE-140 mapping cameras installed on the Salyut-7 manned space station L T

A85-36287
EXPECTATIONS FOR AERIAL PHOTOGRAPHY AS SEEN FROM THE SIDE OF THE USER
E A FLEMING (Department of Energy, Mines and Resources, Surveys and Mapping Branch, Ottawa, Ontario, Canada) ITC Journal (ISSN 0303-2434), no 4, 1984, p 322-326 refs

The work outlines some of the constraints and requirements to aerial photography systems posed by users, taking into consideration basic sensor and camera parameters and such factors as time, costs, and weather conditions Recent technological advances are illustrated through examples of a super wide-angle lens with an increased maximum aperture of f/4 and radial distortion of less than 10 microns, a redesigned wide-angle lens, which offers a 60-percent increase in its information transfer capacity in the visible spectral region, and a fine-grain high-resolution film with an aerial film speed of 40 The U S National High-Altitude Photography Program, defined in 1978, is also discussed L.T

A85-36993
PHOTOMETRY AND POLARIZATION IN REMOTE SENSING
W G EGAN (Grumman Aerospace Corp, Bethpage, Lamont-Doherty Geological Observatory, Palisades, NY) New York, Elsevier, 1985, 514 p refs

Optical remote sensing in the 0 185-12 micron wavelength region is studied with particular focus on the spectral region between 0 4 and 1 0 micron wavelength Optical fundamentals are addressed, including the photometric and polarimetric properties of targets, sensor systems, contrast, calibration, atmospheric effects, data handling and analysis, and interpretation and information Applications are treated, presenting specific photometric, polarimetric, and Stokes parameter determinations from laboratory measurement and remote sensing The effect of the atmosphere on polarization and photometry is described, as is the determination of the absorption and scattering properties of the atmosphere given the aerosol and molecular loading The specific applications considered are hydrology, marine biology and water quality, agriculture, forestry, planetary astronomy, stellar astronomy, atmospheric constituents, oceanography, depolarization, and radiative transfer C D

A85-37199#
ORBITS FOR EARTH OBSERVATION
J MASS and J SARTIEL (Radio Observatory, Haifa, Israel) IN Israel Annual Conference on Aviation and Astronautics, 26th, Haifa, Israel, February 8, 9, 1984, Collection of Papers Haifa, Israel, Technion - Israel Institute of Technology, 1984, p 179-194 refs

Some satellite orbits which enable daylight observation, once or twice daily, of certain areas under good viewing conditions are reviewed The orbits include medium-altitude circular or elliptic heliosynchronous orbits and either geosynchronous or doubly geosynchronous and high-altitude orbits, and can yield high-resolution imagery equivalent to Landsat or SPOT with state-of-the-art optics The duration of observation, the geographic coverage limitations, and the number of usable passes per day are given for each orbit It is shown that all orbits require accurate angular pointing and slewing of the satellite or its viewing axis M D

A85-37726
CONFERENCE ON SATELLITE/REMOTE SENSING AND APPLICATIONS, CLEARWATER BEACH, FL, JUNE 25-29, 1984, PREPRINTS
Conference sponsored by the American Meteorological Society Boston, MA, American Meteorological Society, 1984, 307 p For individual items see A85-37727 to A85-37782.

The technology of meteorological remote-sensing satellites and the processing and application of the data obtained are discussed in reviews and reports Topics examined include new satellite observations and techniques, retrieval techniques, estimation of surface and atmospheric properties, mesoscale cloud and water-related studies, diagnosis of weather systems, information retrieval, ground truth and validation, data assimilation and diagnostics, wind-simulation studies, and simulations of observing systems Graphs, diagrams, maps, and photographs are provided T K

A85-37952
A DECADE OF REMOTE SENSING IN INDIA - SOME SALIENT RESULTS
Y S RAJAN and V R RAO (Indian Space Research Organization, Earth Observation Systems Programme Office, Bangalore, India) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 3-11 refs

Results of remote sensing activities in India over the past decade are presented Important applications such as for agriculture and soil surveys, forestry and vegetation cover, water resources, flood mapping, and geology, are explained The development of remote sensing spacecraft, sensors, and a ground segment is discussed Some facilities for remote sensing applications including the development of low-cost interpretative equipment are described The Indian National Satellite System and the National Natural-Resources Management System under evolution are outlined M D

A85-37953
RESPONSES TO SATELLITE REMOTE SENSING OPPORTUNITIES IN EAST AND SOUTHERN AFRICA
A FALCONER and V A O ODENYO (Regional Remote Sensing Facility, Nairobi, Kenya) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 19-29 refs

A85-37956
DEVELOPMENT AND APPLICATION OF THE INTERACTIVE PLANETARY IMAGE PROCESSING SYSTEM (IPIPS) IN SUPPORT OF REMOTE SENSING STUDIES AT IMPERIAL COLLEGE
G E HUNT (Imperial College of Science and Technology, London, England) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 75-84 Research supported by the Science and Engineering Research Council refs

The Interactive Planetary Image Processing System (IPIPS) which was developed originally for studies of planetary meteorology and oceanography and is now used to support remote-sensing studies in all areas of earth sciences is described The computing machinery, the image-display systems, and the programming that unites them into an interactive research and analysis tool are discussed Some results from research activities are presented, and the role of IPIPS in the Imperial College and University of London teaching program is outlined Author

A85-37957
MAIN RESULTS AND PERSPECTIVES OF SOME CHILEAN EXPERIENCES DEVELOPED WITH LOW COST AND ACCURATE SPATIAL REMOTE SENSING TECHNOLOGY
M F ARAYA (Universidad de Chile, Santiago, Chile) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 85-90 refs

A summary of the main results and perspectives of several Chilean programs developed by using low-cost and accurate remote-sensing techniques is presented Three main applications including the use of satellite-data collection systems in the Antarctic Peninsula to measure meteorological data, the study of geothermal resources in the Los Andes range in Chile by using Landsat multispectral and multitemporal satellite images, and snowmelt runoff forecasting for Andean watersheds by using Landsat data, are considered It is shown that important and useful results, as well as low-cost, reliable, and accurate methodologies are obtained from the studies M D

A85-37959
DIELECTRIC PROPERTIES AND MICROWAVE REMOTE SENSING
R P SINGH (Alberta, University, Edmonton, Canada) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 97-101 refs

The importance of the dielectric properties of earth, ocean and snow surfaces in microwave remote sensing is reviewed Data on dielectric properties of materials in the microwave frequency range are very scarce and their behavior is not fully understood In this paper the need for dielectric properties of ocean and snow surfaces, the earth's surface and subsurface materials is discussed for the quantitative and qualitative interpretation of microwave remote sensing data of developing countries Author

A85-37962
MERGING LANDSAT AND SPACEBORNE RADAR DATA OVER TUNISIA
PH REBILLARD, P N PASCAUD, and D SARRAT (Societe Europeenne de Propulsion, Division de Traitement d'Images, Puteaux, Hauts-de-Seine, France) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 133-138 refs

The registration of Seasat, SIR-A, and Landsat MSS data over a low-relief area with subdesertic climatic conditions located in northern Tunisia is presented Synthetic aperture radar data, acquired over Tunisia by Seasat in August 1978 and by SIR-A in November 1981, both of which provide perpendicular radar illumination directions, are contrasted to the Landsat scenes, overlapping the same area, taken in August 1978 and in September 1981 It is shown that the multispectral and multitemporal coregistered data set enables comparisons between the systems (radar vs MSS and Seasat vs SIR-A) and change detection in the desertification processes and on the surface of the playas M D

A85-37983* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
SPECTRAL CHARACTERIZATION OF THE LANDSAT THEMATIC MAPPER SENSORS
B L MARKHAM and J L BARKER (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, MD) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, May 1985, p 697-716 Previously announced in STAR as N85-20514 refs

Relative spectral response data for the Landsat-4 and Landsat-4 backup multispectral scanner subsystems (MSS), the protoflight and flight models, are presented and compared to similar data for the Landsat 1, 2 and 3 scanners Channel (six channels per band) outputs for soil and soybean targets were simulated and compared within each band and between scanners The principal differences between the spectral responses of the Landsat-4 scanners and previous scanners are discussed The simulated Landsat-4 scanner outputs were 3 to 10 percent lower in the red band and 3 to 11 percent higher in the first near-IR band than previous scanners for the soybeans targets The Landsat-4 scanners were generally more uniform from channel to channel within bands than previous scanners In the upper-band edge of the red band of the protoflight scanner, one channel was markedly different (12 nm) from the rest For a soybeans target, this nonuniformity resulted in a within-band difference of 6 2 percent in simulated outputs between channels A R H

A85-38336
VERSATILE AIRBORNE LASER SYSTEM FOR REMOTE PROBING OF OCEAN, ATMOSPHERE, AND FARMLAND
A F BUNKIN, D V VLASOV, A S GALUMIAN, D V MALTSEV, D M MIRKAMILOV, and V P SLOBODIANIN (Akademiia Nauk SSSR, Institut Obshchei Fiziki, Moscow, USSR) (Zhurnal Tekhnicheskoi Fiziki, vol 54, Nov. 1984, p 2190-2195) Soviet Physics - Technical Physics (ISSN 0038-5662), vol 29, Nov 1984, p 1284-1287 Translation refs

Remote airborne laser probing from heights of about 1000 m is used to record echo-signal spectra from sea surfaces and depths. These signals contain information concerning the surface and depth distributions of chlorophyll, dissolved organic materials, ocean turbidity, etc The airborne apparatus is described in detail, and the potential of the method in environmental-conservation, oceanographic, and agricultural studies is discussed Author

A85-38701
PROBLEMS RELATED TO THE COLLECTION, SYSTEMATIZATION AND USE OF A PRIORI DATA DURING THE DIGITAL PROCESSING OF MULTISPECTRAL DATA OBTAINED FROM SPACE [VOPROSY SBORA, SISTEMATIZATSII I ISPOL'ZOVANIIA APRIORNYKH DANNYKH PRI TSIFROVOI OBRABOTKE MNOGOZONAL'NOI KOSMICHESKOI VIDEOINFORMATSI]
A P TISHCHENKO, ED Leningrad, Gidrometeoizdat (Gosudarstvennyi Nauchno-Issledovatel'skii Tsentr Izucheniia Prirodnykh Resursov, Trudy, No 17), 1984, 126 p In Russian. For individual items see A85-38702 to A85-38719

The methods used in the collection of a priori information and their application in analyses of space multispectral images are detailed with a focus on the development of models for remote sensing data processing Mathematical aspects of evaluating the parameters of natural phenomena by remote sensing are considered In addition, various approaches to aerial photography are discussed, including the feasibility of small unmanned aircraft for sensing and combined aerial and ground-based observations L T

A85-38702
THE POSSIBILITY OF USING SMALL UNMANNED AIRCRAFT FOR STUDIES OF TERRESTRIAL NATURAL RESOURCES [VOZMOZHNOSTI ISPOL'ZOVANIIA MALORAZMERNYKH BESPILOTNYKH LETATEL'NYKH APPARATOV DLIA IZUCHENIIA PRIRODNYKH RESURSOV ZEMLI]
G S GORIN and V G DANILIUK IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 3-10 In Russian

The feasibility of using lightweight remotely piloted aircraft to carry up to approximately 20 kg of remote sensing equipment is analyzed by a comparison of the economic characteristics of two models with those of Ka-26, Mi-2, An-2, and Il-14 aircraft currently used for remote sensing The two models are characterized by payloads of 27 2 and 6 8 kg, cruising speeds of 102 and 80 km/h, ceilings of approximately 4000 m, and a radius of 10-15 km. The aircraft can be launched from either an ejector vehicle or, with minor modifications, from a runway It is noted that due to its lower speeds, the unmanned aircraft can provide a better quality of photography at scales of the order of 1 2000 L.T

A85-38703
FEATURES OF EXPOSURE CONDITIONS AND PHOTOLAB PROCESSING OF MATERIALS OBTAINED FROM AERIAL PHOTOGRAPHY USING THE MKF-6M CAMERA [OSOBENNOSTI USLOVII EKSPONIROVANIIA I FOTOLABORATORNOI OBRABOTKI MATERIALOV AEROS'EMKI KAMEROI MKF-6M]
M. M AFANASOV, L V BONDARENKO, E V. GUNCHENKO, and E D TAMITSKII IN Problems related to the collection, systematization and use of a priori data during the digital processing of multispectral video information obtained from space Leningrad, Gidrometeoizdat, 1984, p 10-14 In Russian

The study outlines the methods used for and results of an experimental optimization of exposure for the six-channel aerospace instrument MKF-6M The trial and error approach was used for the optimization, for each channel a full range of diaphragms and exposures was tried An analysis of film matrices with respect to the developing intensity reveals that the film of the first channel is to be developed up to large contrast coefficients (gamma = 2 5-3 0), in conjunction with the use of higher-contrast film It is also emphasized that the choice of optimal diaphragms depends considerably on the properties of the surface being photographed and on the time of the year Several specific areas of improvement for the system are identified L T.

A85-38801
MACHINE PROCESSING OF REMOTELY SENSED DATA: THEMATIC MAPPER DATA AND GEOGRAPHIC INFORMATION SYSTEMS; PROCEEDINGS OF THE TENTH INTERNATIONAL SYMPOSIUM, PURDUE UNIVERSITY, WEST LAFAYETTE, IN, JUNE 12-14, 1984
M M KLEPFER, ED and D B MORRISON, ED Symposium sponsored by the American Society of Agronomy, Crop Science Society of America, IEEE, et al New York, Institute of Electrical and Electronics Engineers, 1984, 478 p For individual items see A85-38802 to A85-38846

Topics related to TM data quality analysis are examined, taking into account a Thematic Mapper (TM) geometric correction performance evaluation, Thematic Mapper radiometric characterization, algorithms for the estimation of failed detector data, a comparison between multispectral classification accuracy of Landsat-4 MSS and TM in Hartford and Miami, a single class stepwise linear discriminant analysis of Landsat-4 Thematic Mapper data, and an information content comparison of Thematic Mapper, Multispectral Scanner (MSS), and airborne Thematic Mapper data Other subjects explored are related to trends in geobotanical remote sensing, vegetative cover analysis via remote sensing, applications of remote sensing for land cover/land use evaluation, TM applications to physical components of the environment, preprocessing and analysis techniques, vegetation characteristics estimation, and geographic information system (GIS) characteristics, needs, and applications Attention is given to wetlands classification, an automatic cloud cover assessment, and data for crop area estimation G R

A85-38830
EXPERIENCE WITH THE USE OF SUPERCOMPUTERS TO PROCESS LANDSAT DATA
M OZGA (U S Department of Agriculture, Washington, DC) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p. 276-280 refs

Attention is given to the computing requirements of a United States Department of Agriculture (USDA) program to compile crop acerage estimates for the entire country based on Landsat data The basic architecture and computing capacities of three supercomputer systems, in use at USDA over the last five years, are described The specific systems include the ILLIAC-IV pipelined supercomputer; the CRAY-1 S supercomputer; and the CYBER 200 system Preliminary results of an experiment to process Landsat Thematic Mapper (TM) data using a Massively Parallel Processor (MPP) system are also discussed. I H

A85-39829
ON THE USE OF SATELLITE ESTIMATES OF PRECIPITATION IN INITIAL ANALYSES FOR NUMERICAL WEATHER PREDICTION
M DANARD (Atmospheric Dynamics Corp , Victoria, University, Victoria, British Columbia, Canada) Atmosphere - Ocean (ISSN 0705-5900), vol 23, March 1985, p 23-42 Research supported by the Atmospheric Environment Service and Natural Sciences and Engineering Research Council refs

A four-dimensional data assimilation procedure which, by improving the first-guess fields for the next analysis time, incorporates satellite estimates of precipitation into the initialization of operational numerical weather prediction models, is described Using an adaptation of the method of Richards and Arkin (1981), precipitation is estimated from infrared satellite photographs Predictions are made with and without satellite estimates of precipitation for five 24-h periods in the development of two intense North Pacific cyclones, in order to test the effectiveness of the technique The results indicate that the average 1000-mb mean error is reduced from 38 to 11 m by the addition of satellite data, the standard error is diminished from 57 to 41 m, and the S1 score is lowered from 57 to 43 M D

N85-23222*# Jet Propulsion Lab , California Inst of Tech , Pasadena
SCIENCE OPPORTUNITIES USING THE NASA SCATTEROMETER ON N-ROSS
M H FREILICH 1 Feb 1985 44 p refs
(Contract NAS7-918)
(NASA-CR-175639, JPL-PUB-84-57, NAS 1 26 175639) Avail NTIS HC A03/MF A01 CSCL 14B

The National Aeronautics and Space Administration scatterometer (NSCAT) is to be flown as part of the Navy Remote Ocean Sensing System (N-ROSS) scheduled for launch in 1989 The NSCAT will provide frequent accurate and high-resolution measurements of vector winds over the global oceans NSCAT data will be applicable to a wide range of studies in oceanography, meteorology, and instrument science The N-ROSS mission, is outlined, are described The capabilities of the NSCAT flight instrument and an associated NASA research ground data-processing and distribution system, and representative oceanographic meteorological, and instrument science studies that may benefit from NSCAT data are surveyed Author

N85-23855*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
DETERMINATION OF ELECTROMAGNETIC PROPERTIES OF MESH MATERIAL USING ADVANCED RADIOMETER TECHNIQUES
R F ARRINGTON and H J C BLUME *In its* Large Space Antenna Systems Technol , 1984, Pt 2 p 737-756 Apr 1985 refs
Avail NTIS HC A21/MF A01 CSCL 20N

The need for a large diameter deployable antenna to map soil moisture with a 10 kilometer or better resolution using a microwave radiometer is discussed A 6 meter deployable antenna is also needed to map sea surface temperature on the Navy Remote Ocean Sensor System (NROSS) Both of these deployable antennas require a mesh membrane material as the reflecting surface The determination of the electromagnetic properties of mesh materials is a difficult problem The Antenna and Microwave Research Branch (AMRB) of Langley Research Center was asked to measure the material to be used on MROSS by NRL A cooperative program was initiated to measure this mesh material using two advanced radiometer techniques B W

N85-23869# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
DATA COLLECTION AND PLATFORM LOCATION BY SATELLITE: ARGOS USERS' CONFERENCE
1980 137 p refs Partly in ENGLISH and FRENCH Conf held in Quebec, 1-2 Oct 1980
Avail NTIS HC A07

Operational reliability of the ARGOS system, system performance, data distribution, and technical files, platform transmitter terminals, the PAPA meteorological buoy project, ARGOS operation in Arctic regions and ice environments, the BALSAMINE monsoon monitoring experiment, fishery data collection, and hydrological uses of ARGOS are discussed

N85-23870# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
THE ARGOS SYSTEM STATUS REPORT AFTER 2 YEARS OPERATION
J L BESSIS *In its* Data Collection and Platform Location by Satellite 23 p 1980 In FRENCH; ENGLISH summary
Avail NTIS HC A07/MF A01

The ARGOS data collection and platform location contribution to the NOAA-TIROS program is reviewed Of 100 platforms seen during each orbit, 60 are correctly located Location error is 100 m Environmental data collection for atmospheric, oceanographic, and Earth sciences is increasing with each year of system operation Apart from real time demands for meteorology, it is not possible to meet all user requirements by the sole implementation of direct readout stations Author (ESA)

N85-23871# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
SYSTEM PERFORMANCE, DATA DISTRIBUTION AND TECHNICAL FILES
A GOASGUEN *In its* Data Collection and Platform Location by Satellite 7 p 1980 In FRENCH, ENGLISH summary
Avail NTIS HC A07/MF A01

The performance and mode of operation of the ARGOS platform location function, means of resolving the ambiguity in the case of one-pass position calculations, and method for the calculation of platform position and speed using data acquired during two passes are discussed Operational status of the data distribution system and means of access to experiment data are described Practical aspects of the filling out ARGOS technical files once a program is admitted to the system are covered Author (ESA)

N85-23872# Electronique Marcel Dassault, St Cloud (France)
THE ARGOS PLATFORM TRANSMITTER TERMINALS (PTTS)
M PEBERAY *In* CNES Data Collection and Platform Location by Satellite 8 p 1980 In FRENCH, ENGLISH summary
Avail NTIS HC A07/MF A01

Location and data collection platforms for use on ARGOS buoys, boats and balloons, and data collection only types for stations were developed With the standard versions the sensor signals must be in serial binary form However, an interface can be inserted between the sensors and electronics to meet specific requirements The platforms operate at 406 1 MHz Almost 500 platforms are in use Author (ESA)

N85-23884# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS
THE ARGOS SYSTEM STATUS REPORT
J L BESSIS *In its* Data Collection and Platform Location by Satellite 19 p 1981
Avail NTIS HC A05/MF A01

The ARGOS data collection and platform location contribution to the NOAA-TIROS program is reviewed Of 100 platforms seen during each orbit, 60 are correctly located Location error is 100 m Environmental data collection for atmospheric, oceanographic, and Earth sciences is increasing with each year of system operation Apart from real time demands for meteorology, it is not possible to meet all user requirements by the sole implementation of direct readout stations Author (ESA)

N85-23895# National Oceanic and Atmospheric Administration, Washington, D C. National Environmental Satellite, Data and Information Service

UTILIZATION OF THE POLAR PLATFORM OF NASA'S SPACE STATION PROGRAM FOR OPERATIONAL EARTH OBSERVATIONS

J H. MCELROY and S. R SCHNEIDER Sep 1984 76 p refs (PB85-152502; NOAA/TR/NESDIS-12) Avail NTIS HC A05/MF A01 CSCL 22B

Principal elements concerning the development of NASA's polar platform are discussed The utilization of the platform in operational monitoring of the Earth's atmosphere, oceans, and land masses is discussed The payload for the platform would include instruments derived from the current operational environmental satellites, ocean satellites that will be flown by several countries during the next decade, research programs and land satellite systems -- both governmental and commercial. These instruments may justify two polar-orbiting, Sun-synchronous, astronaut-serviced platforms The platforms would be at an altitude in the range from 700 to 900 kilometers and be at two equatorial crossing times, one early in the morning between 8 30 and 10 30 A M southbound and the second near noon, perhaps at 1 00 P M northbound GRA

N85-24269*# Jet Propulsion Lab, California Inst of Tech, Pasadena

GEOMETRIC ERROR ANALYSIS FOR SHUTTLE IMAGING SPECTROMETER EXPERIMENT

S J WANG and C H C IH 15 Dec 1984 172 p refs (Contract NAS7-918)

(NASA-CR-175665, JPL-PUB-85-2, NAS 1 26 175665) Avail NTIS HC A08/MF A01 CSCL 14B

The demand of more powerful tools for remote sensing and management of earth resources steadily increased over the last decade With the recent advancement of area array detectors, high resolution multichannel imaging spectrometers can be realistically constructed The error analysis study for the Shuttle Imaging Spectrometer Experiment system is documented for the purpose of providing information for design, tradeoff, and performance prediction Error sources including the Shuttle attitude determination and control system, instrument pointing and misalignment, disturbances, ephemeris, Earth rotation, etc, were investigated Geometric error mapping functions were developed, characterized, and illustrated extensively with tables and charts Selected ground patterns and the corresponding image distortions were generated for direct visual inspection of how the various error sources affect the appearance of the ground object images Author

N85-24348# Centre National d'Etudes Spatiales, Toulouse (France) Service ARGOS

PROCEEDINGS OF THE ARGOS USERS CONFERENCE ON DATA COLLECTION AND LOCATION BY SATELLITE

1981 152 p refs Proc held in San Francisco, 28-29 Oct 1981

Avail NTIS HC A08

Equipment used in the ARGOS data collection and location system, ARGOS oceanography/offshore projects, glaciology, meteorology, hydrology, and bear and dolphin tracking were discussed

N85-24353# Toyo Communication Equipment Co Ltd, Kanagawa (Japan)

THE DEVELOPMENT OF PLATFORM TRANSMITTER TERMINAL (PTT) AND ITS APPLICATION FOR DRIFTING BUOYS

M TSUTSUMI *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 9 p 1981

Avail NTIS HC A08/MF A01

A PCM-PSK transmitter to be incorporated into a drifting buoy used in the ARGOS localization and data collection system was designed It transmits 2 W at 401 65 MHz A high-stability oscillator and a phase-locked loop circuit provide high frequency stability and enable the platform to be localized to within 1 km The transmitter consists of two 25 x 9 cm printed circuit boards, a transmission board and a logic control board, weighing together 600 g. Current drain during transmission is 0.7 A. Average power consumption is 0 3 W Author (ESA)

N85-24355# National Oceanic and Atmospheric Administration, Rockville, Md.

US PROGRAMS USING THE ARGOS DATA COLLECTION AND PLATFORM LOCATION SYSTEM

T E BRYAN *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 9 p 1981 Sponsored in part by NOAA, US Coast Guard and NSF

Avail NTIS HC A08/MF A01

Drifting buoy, constant level balloon, and moored, shipboard and animal tracking system experiments carried out by NOAA, the US Coast Guard, the Office of Naval Research, and the National Science Foundation using the ARGOS data collection and platform location system are summarized The experiments cover oceanographic, meteorological, pollution monitoring, Arctic region, and atmospheric studies Author (ESA)

N85-24360# Wisconsin Univ, Madison Dept of Meteorology

AUTOMATIC WEATHER STATIONS IN ANTARCTICA

M L SAVAGE, C R STEARNS, and C TEAGUE (Stanford University, California) *In* CNES Proc of the ARGOS Users Conf on Data Collection and Platform 10 p 1981 refs Sponsored by NSF

Avail NTIS HC A08/MF A01

Twelve automatic weather stations to measure surface air temperature, pressure, wind speed, and wind direction were deployed in Antarctica The stations utilize the ARGOS data system aboard TIROS-N and NOAA satellites for data delivery Each station consists of a 3m tower supporting the sensors and an electronics enclosure containing a microcomputer and the ARGOS transmitter Six stations use radioisotope thermoelectric generators for power The others use storage batteries and a solar panel for battery charging The stations transmit 256 bits of data every 200 sec The sensors are interrogated every 10 min and 50 min of stored data is contained in each transmission Each station is visible to the satellite for 10 min of the 101 min orbit The stations, operating since 1979, successfully endure temperatures of -75 C and winds of 39 m/sec The station located at Dome Charlie performs flawlessly despite the mean annual temperature of -52 C Author (ESA)

N85-24775 Centre National d'Etudes Spatiales, Toulouse (France).

THE ARGOS PROGRAM [LE PROGRAMME ARGOS]

M. TAILLADE and D LUDWIG *In its* Space Math for the Prepn and the Develop of Satellite Exploit p 843-864 1984 refs In FRENCH

Avail CEPADUES, Toulouse, France

The ARGOS satellite based localization system is described The user-platform weighs only 2 kg, so can be carried by a wide range of targets, e g, balloons, icebergs or animals The platforms are linked to NOAA satellites, which act as relay stations for platform and satellite environmental and experiment data Special ground stations were built for direct data collection The localization system is based on Doppler positioning, with 60% of platforms located at each satellite passage Accuracy is within 100 m The data processing system assures 99% availability of data, 66% of the data are available 3 hr after measurement, 87.5% 6 hr Information includes raw and converted sensor data, and position, speed, and last localization date of platforms Real time data transmission is assured by the Global Telecommunication System Data are used in atmospheric science, oceanography and Earth sciences Author (ESA)

N85-25988*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
HURRICANE STRUCTURE AND DYNAMICS FROM STEREOSCOPIC AND INFRARED SATELLITE OBSERVATIONS AND RADAR DATA
A HASLER and R MORRIS (GSC) *In its* Mesoscale Atmospheric Processes Res Program Sci Rev 2 p 1985
Avail NTIS HC A06/MF A01 CSCL 04B

The objectives, significant accomplishments, and future plans of a project to determine the relation of tropical cyclone cloud characteristics and structure to storm rainfall and dynamics are summarized The project emphasis is on special data sets where geosynchronous satellite observations (visible, infrared, and stereo) of clouds are available along with cloud track winds (with stereo height assignment) and ground-based or aircraft-based radar reflectivity data Infrared and stereoscopic visible satellite data from GOES-East and West were combined with ground-based radar data from Hurricane Frederic (1979) and time-composited airborne radar from Hurricane Allen (1980) to investigate hurricane cloud and precipitation structure Cloud winds with stereoscopic cloud top height assignments were measured within a ten degree latitude radius of Hurricane Frederic using 7 5 min interval GOES data and were combined with rawinsonde and low-level aircraft wind data It was observed that stereoscopically measured cloud top heights in these hurricanes are not nearly as closely correlated to radar reflectivity at lower levels as they are in intense thunderstorms over land M G

N85-25989*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
MONITORING TROPICAL CYCLONE GROWTH USING GOES VISSR/VAS AND NIMBUS-7 TOMS DATA
E RODGERS, J STERANKA (GSC), and J STOUT (GSC) *In its* Mesoscale Atmospheric Processes Res Program Sci Rev 5 p 1985 refs
Avail NTIS HC A06/MF A01 CSCL 04B

The objectives, accomplishments, and future research of a project to monitor and possibly predict tropical cyclone intensity change (maximum winds or minimum pressure), strength change (average wind speed at radii between 100 and 300 km), and outer circulation change (average wind speed beyond 400 km) using satellite data are discussed Tropical cyclone growth changes are dependent upon the inertial stability of the storm's circulation Since the storm's lower and middle troposphere is highly stable while the upper troposphere is weakly stable, strength and outer circulation changes are monitored by examining the lower- and middle-tropospheric forcing and intensity changes are monitored by examining the upper-tropospheric forcing Multiple linear regression equations were derived to retrieve geopotential height, layer thickness, and precipitable water content from GOES vertical atmospheric sounder (VAS) every 3 h in clear regions surrounding tropical cyclones Beryl and Debbie Advective and mass adjustment processes associated with changes in the upper-tropospheric circulation surrounding tropical cyclone Irene were examined using the GOES visible/infrared spin-scan radiometer (VISSR) and Nimbus-7 total ozone monitoring system (TOMS) data M G

N85-25990*# Pennsylvania State Univ , University Park
ANALYSIS OF THE INFLOW AND AIR-SEA INTERACTIONS IN HURRICANE FREDERIC
W FRANK *In* NASA Goddard Space Flight Center Mesoscale Atmospheric Processes Res Program Sci Rev 3 p 1985 refs
Avail NTIS HC A06/MF A01 CSCL 04B

Significant accomplishments and future plans of a project to study the properties of Hurrican Frederic are summarized The specific objectives of the study are to (1) determine the effective heights of the satellite wind vectors, (2) integrate satellite, aircraft, rawinsonde, and surface wind measurements into a three-dimensional analysis of the storm inflow layer over water, (3) construct similar analyses of the thermodynamic fields in the inflow layer, (4) perform diagnostic budget analyses of moisture, sensible heat, kinetic energy, and momentum in the inflow layer, and (5) examine air-sea interactions from residuals in the budget analyses M G

N85-26001*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
MESOSCALE ANALYSIS AND MODELING GROUP
L UCCELLINI *In its* Mesoscale Atmospheric Processes Res Program Sci Rev 3 p 1985
Avail NTIS HC A06/MF A01 CSCL 04B

The specific objectives of the Mesoscale Analysis and Modeling Group are (1) detailed studies of the SESAME-, VAS-, and CCOPE-related cases and other cases as well emphasizing the role of gravity waves, jet streaks, and frontogenesis in severe local and winter storms, (2) studies emphasizing the interactions between larger-scale dynamics-boundary layer, atmosphere-ocean and stratosphere-troposphere during severe weather events, (3) numerical simulations of specific cases to better understand the scale interaction associated with fronts and jets, the synergistic relationship between large-scale dynamics and physical processes in the pre-storm environment, and the sensitivity of the forecasts to initial state perturbations, (4) the assessment of total ozone analysis from TOMS and water vapor imagery for the study of jet streak circulations, tropopause folds, and associated severe weather events, and (5) an evaluation of mesoscale models over a large number of cases to determine the utility of the models for satellite impact Author

N85-26013*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
EAST COAST SNOWSTORM SURVEY
P KOCIN and L UCCELLINI *In its* Mesoscale Atmospheric Processes Res Program Sci Rev 3 p 1985
Avail NTIS HC A06/MF A01 CSCL 04B

The temporal and spatial characteristics of a large sample of major winter snowstorms that paralyzed the heavily urbanized centers of the Northeast are described by utilizing snowfall, surface and upper-air rawinsonde observations, model simulations, and satellite imagery The current literature on East Coast storms is surveyed An atlas of cases is of use to the research community (especially with regard to upcoming GALE and STORM projects) and to operational and university needs (especially geared to forecasters and students) is constructed E A K

N85-27325*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
SIMULTANEOUS EARTH OBSERVATIONS FROM 2 SATELLITES
H E MONTGOMERY Mar 1985 7 p refs
(NASA-TM-86204, REPT-85B0288, NAS 1 15 86204) Avail NTIS HC A02/MF A01 CSCL 05B

Simultaneous co-located observations from two different orbits lead to several advantages (i e , cross calibration of sensors and a wider range of solar-zenith and sensor look angles) The question was asked how many times per year (on the average) do the sub-satellite points of two satellites simultaneously come within D kilometers of each other? For the Space Station (altitude 500 km, inclination 28 deg) and a Sun synchronous satellite (altitude 705 km, inclination 98 21 deg) the answers are 16, 41 and 82 times per year for encounter distances D of 20, 50, and 100 km espectively The relationship between encounters per year and distance D is linear The answers were obtained in two ways (1) a closed form statistical approach which led to a simple algebraic expression, and (2) a Monte Carlo type computer solution The largest difference between the two solutions was less than 12% Author

N85-27329# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
FUNCTION OF REMOTE SENSING IN BRAZIL [O EMPREGO DE SENSORIAMENTO REMOTO NO BRASIL]
N D J PARADA and R A NOVAES Oct 1984 11 p In PORTUGESE Submitted for publication
(INPE-3314-PRE/621) Avail. NTIS HC A02/MF A01

The 1984 annual review of the Latin American Society of Remote Sensing Specialists (SELPER) is presented Emphasis is placed on the application of remote sensing to agriculture geology, image processing, horticulture, meteorology and oceanography, water resources, land use, development of sensory systems, geomorphology, and soil classification The development of foreign programs involving remote sensing satellites also is discussed
Transl by B G.

N85-27463*# Pacific Northwest Lab , Richland, Wash
ANALYSIS OF THE NASA/MSFC AIRBORNE DOPPLER LIDAR RESULTS FROM SAN GORGONIO PASS, CALIFORNIA Contractor Report, 1 Oct. 1982 - 31 Dec. 1984
W C CLIFF, J R SKARDA, D S. RENNE, and W F SANDUSKY Washington NASA May 1985 71 p refs
(Contract NAS8-34733)
(NASA-CR-3901, NAS 1 26 3901, M-489) Avail NTIS HC A04/MF A01 CSCL 04B

The NASA/MSFC Airborne Doppler Lidar System was flown in July 1981 aboard the NASA/Ames Convair 990 on the east side of San Gorgonio Pass California, near Palm Springs, to measure *and investigate the accelerated atmospheric wind field discharging* from the pass At this region, the maritime layer from the west coast accelerates through the pass and spreads out over the valley floor on the east side of the pass The experiment was selected in order to study accelerated flow in and at the exit of the canyon Ground truth wind data taken concurrently with the flight data were available from approximately 12 meteorological towers and 3 tala kites for limited comparison purposes The experiment provided the first spatial data for ensemble averaging of spatial correlations to compute lateral and longitudinal length scales in the lateral and longitudinal directions for both components, and information on atmospheric flow in this region of interest from wind energy resource considerations Author

N85-27491# National Oceanic and Atmospheric Administration, Miami, Fla Oceanographic and Meteorological Labs
HURRICANE RESEARCH DIVISION, FISCAL YEAR 1984 PROGRAMS, FISCAL YEAR 1985 PROJECTIONS
Jan 1985 58 p refs
Avail NTIS HC A04/MF A01 CSCL 04B

The Hurricane Research Division (HRD) is NOAA's primary focus for research on hurricanes and tropical meteorology HRD's research is directed at improved hurricane prediction through improved physical understanding of the structure and dynamics of these storms HRD's annual hurricane field program uses the highly instrumented NOAA WP-3D research aircraft to acquire data sets that are analyzed to describe and understand the dynamics and energetics of hurricanes HRD interacts with the National Hurricane Center in all phases of its program HRD also interacts with the National Meteorological Center on problems of hurricane prediction and modeling, and with the National Center for Atmospheric Research on investigations of the hurricane's inner core GRA

N85-28286*# Jet Propulsion Lab , California Inst. of Tech , Pasadena
THERMAL INFRARED MULTISPECTRAL SCANNER (TIMS): AN INVESTIGATOR'S GUIDE TO TIMS DATA
F D PALLUCONI and G R MEEKS (NASA Earth Resources Lab) 1 Jun 1985 32 p
(Contract NAS7-918)
(NASA-CR-175875, JPL-PUB-85-32; NAS 1 26 175875) Avail NTIS HC A03/MF A01 CSCL 14B

The Thermal Infrared Multispectral Scanner (TIMS) is a NASA aircraft scanner providing six channel spectral capability in the thermal infrared region of the electromagnetic spectrum Operating in the atmospheric window region (8 to 12 micrometers) with a channel sensitivity of approximately 0 1 C, TIMS may be used whenever an accurate measure of the Earth's surface is needed A description of this scanner is provided as well as a discussion of data acquisition and reduction Author

N85-28508*# Wisconsin Univ , Madison
TEST AND EVALUATION PLAN FOR THE CENTRALIZED STORM INFORMATION SYSTEM Final Report
In its Centralized Storm Information System (CSIS) 30 p Apr. 1985
Avail NTIS HC A08/MF A01 CSCL 04B

The installation of the Centralized Storm Information System (CSIS) at the NOAA operational complex in Kansas City, Missouri is described This complex includes the National Severe Storms Forecast center and a Satellite Field Service Station which is denoted in this research plan as NSSFC CSIS computers will act in concert to merge analyze the many data sets needed to forecast severe convective storms Specific aspects of CSIS are evaluated against the CSIS objectives The functions to be evaluated characterize the attributes of a generalized interactive computer system A major development in the CSIS program will allow communication between CSIS and the NSSFC Eclipse computer
B W

N85-28511*# Simpson Weather Associates, Charlottesville, Va
CONVECTIVE STORM DOWNDRAFT OUTFLOWS DETECTED BY NASA/MSFC'S AIRBORNE 10.6 MICRON PULSED DOPPLER LIDAR SYSTEM Contractor Rept., 30 Jul. 1984 - 29 Jul. 1985
G D EMMITT Washington NASA May 1985 50 p refs
(Contract NAS8-35597)
(NASA-CR-3898, NAS 1 26 3898) Avail NTIS HC A04/MF A01 CSCL 04B

The capability of a unique Airborne Doppler Lidar System to measure the horizontal winds in the vicinity of severe storm activity is demonstrated The Airborne Doppler Lidar System (ADLS), developed at NASA/MSFC, was flown on a CV990 research aircraft during the CCOPE (Cooperative Convective Precipitation Experiments, Montana, Summer 1981) Flown between 400 and 600 m AGL, the lidar probed the subcloud regions of several *deep convection storms ADLS data collected near storms on 21* and 23 July 1981 are presented along with satellite imagery, radar echo maps and surface station measurements These case studies are evidence of the successful performance of an airborne remote wind sensing system and the advantages of two dimension flow visualization of storm outflow structures and interactions R J F

09

GENERAL

Includes economic analysis

A85-30746
INDIAN REMOTE-SENSING SATELLITE - UTILIZATION PLAN
P D BHAVSAR (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, Mar -Apr 1985, p 591-597 refs

A very densely populated large country such as India requires a very efficient and reliable system for the collection of resources information so that timely managerial decisions can be taken Realizing this need and based on the experience over several years past, it has been decided that India should have its own remote-sensing satellite program for this purpose This experience has been gained over more than half a century, first through black-and-white panchromatic aerial surveys, then through the use of Landsat data and false-color photographic and multispectral scanner aerial surveys and finally through conducting end-to-end result-oriented experiments proving the feasibility of using remote

sensing in crucial information requirements of the country A comprehensive utilization plan for a decade, in collaboration with the users in the country, has been formulated The salient features of this utilization plan are presented Author

A85-34218
REMOTE SENSING - A TORTUOUS TRIP TO MARKETPLACE
P MANN Commercial Space (ISSN 8756-4831), vol 1, Spring 1985, p 32, 33, 35-37

Remote sensing represents a thirteen-year old U S government experiment in gathering earth surface images by satellite in outer space If the experiment is transferred successfully from government to private sector, it might develop in the next decade into a data market worth billions of dollars According to the most recent estimates, remote sensing's gross revenues might reach $2 billion annually by the year 2000 for raw data sales alone In 1983, President Reagan made the decision to accelerate transfer of remote sensing operations ahead of the schedule set forth by President Carter This decision was partly the result of Reagan's philosophy of removing government from the private economy, another factor was the need to reduce federal expenditures The present status of remote sensing is discussed along with the services which are provided A description of future developments is also presented G R

A85-37954
THE PRIVATE SECTOR - A GLOBAL POOL OF TECHNICAL TALENT FOR REMOTE SENSING TRAINING AND PROGRAM SUPPORT
W D CARTER (Globex, Inc , Reston, VA) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol 4, no 11, 1984, p 49-57

An overview of what has happened in space research and technology over the past 25 years, and an outlook for the future are presented Consideration is given to weather, communications, and earth-resource satellites It is demonstrated that there is a change from government-financed programs toward greater diversification and development of initiatives in the private sector resulting in cheaper products that are more available to the potential users of space-derived information The private sector and its various elements and capabilities are discussed A list of 150 space technology companies, their locations and products and/or services is given M D

A85-38802* National Aeronautics and Space Administration, Washington, D C
THE NASA LAND PROCESSES PROGRAM - STATUS AND FUTURE DIRECTIONS
R E MURPHY (NASA, Land Processes Branch, Washington, DC) IN Machine processing of remotely sensed data Thematic Mapper data and geographic information systems, Proceedings of the Tenth International Symposium, West Lafayette, IN, June 12-14, 1984 New York, Institute of Electrical and Electronics Engineers, 1984, p 9-12 refs

For most of the past decade, NASA focused its efforts on the immediate exploitation of space-based sensors in earth-oriented programs After an assessment of the current situation with respect to the conducted programs, NASA has restructured its earth-oriented programs to concentrate on the scientific use of its satellites while other agencies and private enterprise have assumed responsibility for programs of interest to them In making this change of direction, NASA has conducted a series of studies to obtain information as a basis for its planning activities regarding future programs Attention is given to a plan for Land Global Habitability, the development of a basic structure for the land program, a program plan for global biology, and a study on the role of biochemical cycles The three major facets of the land processes program are discussed along with some examples of current work G R

N85-23224*# National Aeronautics and Space Administration, Washington, D C
NASA'S LAND REMOTE SENSING PLANS FOR THE 1980'S
H C HIGG, K M BUTERA, and M SETTLE *In* NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration p 1-5 Feb 1985
Avail NTIS HC A09/MF A01 CSCL 05A

Research since the launch of LANDSAT-1 has been primarily directed to the development of analysis techniques and to the conduct of applications studies designed to address resource information needs in the United States and in many other countries The current measurement capabilities represented by MSS, TM, and SIR-A and B, coupled with the present level of remote sensing understanding and the state of knowledge in the discipline earth sciences, form the foundation for NASA's Land Processes Program Science issues to be systematically addressed include energy balance, hydrologic cycle, biogeochemical cycles, biological productivity, rock cycle, landscape development, geological and botanical associations, and land surface inventory, monitoring, and modeling A global perspective is required for using remote sensing technology for problem solving or applications context A successful model for this kind of activity involves joint research with a user entity where the user provides a test site and ground truth and NASA provides the remote sensing techniques to be tested A R H

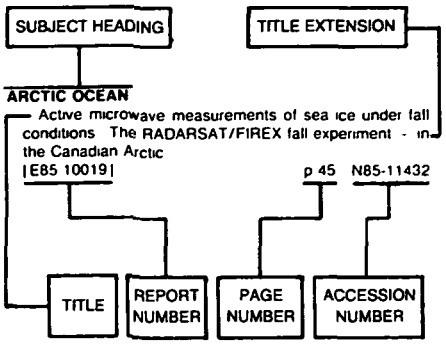
N85-29405# Woodrow Wilson International Center for Scholars, Washington, D C American Society and Politics Program
ENVIRONMENTAL MANAGEMENT NEEDS Final Report, 19 Sep. 1983 - 31 Dec. 1984
1984 674 p refs Proc of the Conf on the Evolution of Am Environ Politics, Washington, D C , 28 Jul 1984
(Contract DE-FG01-83EP-16032)
(DE85-007859, CONF-8406246) Avail NTIS HC A99/MF E03

The origins, evolution, and current circumstances of some of the most important institutions and public policies at the national level in the field of environmental affairs were investigated from a historical perspective Selected topics in both the regulatory area and in the area of preservation and management of resources were covered DOE

N85-29497# European Space Agency, Paris (France)
LOOKING DOWN LOOKING FORWARD: EARTH OBSERVATION, SCIENCES AND APPLICATIONS, A PERSPECTIVE
B BATTRICK, ed Jan 1985 54 p refs Original contains color illustrations
(ESA-SP-1073, ISSN-0396-566) Avail NTIS HC A04/MF A01

Achievements and applications of Earth observations (from space) in atmosphere, oceans/ice, land, solid Earth, and climate and environment studies are reviewed and an ESA Earth observation program is proposed The program comprises continuation and improvement of European involvement in satellites for meteorological applications, and in particular the development of a second-generation METEOSAT to be placed in geostationary orbit, the establishment, following ERS-1, of a program with a research and development and an operational element in ocean/ice observation, all weather monitoring and optical observation of the land surface, and a mission exploiting precise measurement techniques for solid Earth geophysics Author (ESA)

Typical Subject Index Listing



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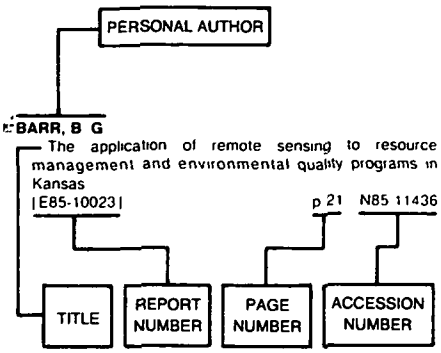

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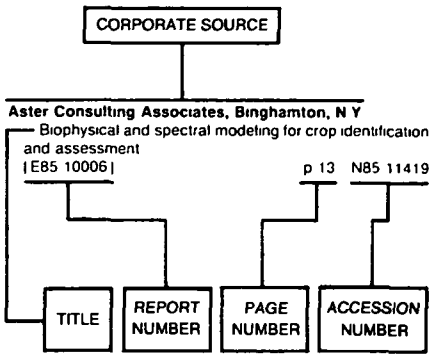

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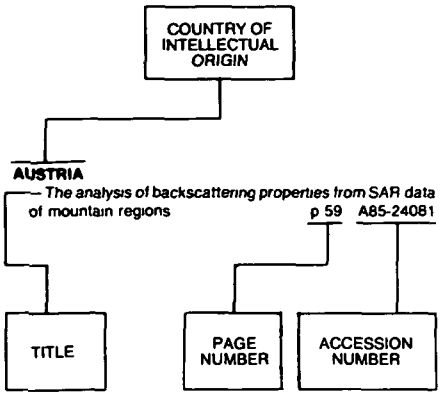

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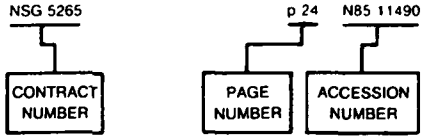

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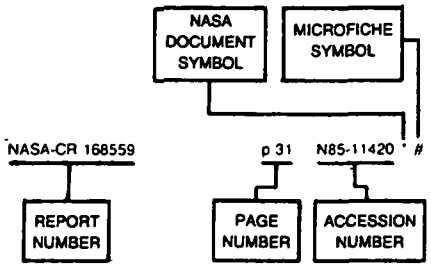

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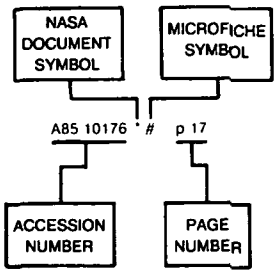

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15. Supplementary Notes

16. Abstract

This bibliography lists 524 reports, articles and other documents introduced into the NASA scientific and technical information system between July 1 and September 30, 1985. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economical analysis.

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